THE SURGICAL CLINIC OF CHICAGO

OCTOBER 1920

VOLUME 4—NUMBER 5

WITH 46 ILLUSTRATIONS

PUBLISHED BI MONTHLY

W B SAUNDERS COMPANY

PHILADELPHIA AND LONDON

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CONTRIBUTORS TO THIS NUMBER

EDMUND ANDREWS, M. D., Instructor in Surgery, Northwestern University Medical School.

E. WYLLYS ANDREWS, M. D., Professor of Surgery, Northwestern University Medical School; Chief of Staff, Mercy Hospital, Chicago; Surgeon in Chief, Cook County Hospital, Chicago; Attending Surgeon, Michael Reese Hospital, Chicago.

CARL BECK, M. D., Surgeon, North Chicago Hospital.

ARTHUR DEAN BEVAN, M. D., Professor of Surgery, Rush Medical College, in Affiliation with the University of Chicago; Surgeon to the Presbyterian Hospital, Chicago.

EDWARD LYMAN CORNELL, M. D., Attending Obstetrician, Chicago Lying-In Hospital and Dispensary; Attending Obstetrician, Provident Hospital; Associate in Obstetrics, Northwestern University Medical School.

FREDERICK G. DYAS, M. D., Assistant Professor of Surgery, College of Medicine, University of Illinois; Attending Surgeon, Cook County Hospital, Chicago.

DANIEL M. EISENDRATH, M. D., Clinical Professor of Surgery, Rush Medical College, Chicago; Attending Surgeon, Michael Reese and Cook County Hospitals, Chicago.

LEE C. GATEWOOD, M. D., Associate in Medicine, Rush Medical College, Chicago.

ALLEN B. KANAVEL, M. D., Assistant Professor of Surgery, Northwestern University Medical School; Attending Surgeon, Wesley Memorial and Cook County Hospitals, Chicago.

GOLDEN L. MCWHORTER, M. D., Instructor in Surgery, Rush Medical College, Chicago.

CHARLES LOUIS MIX, M. D., Professor of Clinical Medicine, Northwestern University Medical School; Attending Physician, Mercy Hospital, Chicago.

ROY L. MOODIE, PH. D., Associate Professor of Anatomy, University of Illinois, Chicago.

EDWARD LOUIS MOORHEAD, M. D., Professor and Head of the Department of Surgery, Loyola University School of Medicine; Chief of Staff and Senior Surgeon, Mercy Hospital; Consulting Surgeon, Oak Park Hospital.

ALBERT J. OCHSNER, M. D., LL. D., Surgeon in Chief, Augustana and St. Mary's Hospitals, Chicago; Professor of Clinical Surgery in the Medical Department of the State University of Illinois.

GEORGE E. SHAMBAUGH, M. D., Professor of Otology and Laryngology, Rush Medical College, Chicago; Otologist to the Presbyterian Hospital, Chicago.

KELLOGG SPEED, M. D., Associate Professor of Surgery, Rush Medical College, Chicago; Associate Attending Surgeon, Presbyterian Hospital; Attending Surgeon, Cook County and Provident Hospitals, Chicago.

ALFRED A. STRAUSS, M. D., Michael Reese Hospital, Chicago.

DAVID C. STRAUS, M. D., Instructor in Surgery, Rush Medical College; Attending Surgeon, Cook County Hospital; Associate Attending Surgeon, Michael Reese Hospital, Chicago.

RICHARD J. TIVNEN, M. D., Instructor in Ophthalmology, Northwestern University Medical School.

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SURGICAL CLINICS OF CHICAGO

Volume 4 Number 5

CLINIC OF DRS E. WYLLYS AND EDMUND ANDREWS AND DR. CHARLES LOUIS MIX

ST LUKE'S HOSPITAL

"DUMPING STOMACH" AND OTHER RESULTS OF GASTROJEJUNOSTOMY: OPERATIVE CURE BY DISCONNECTING OLD STOMA

Summary DR. MIX History of case. Physical, x-ray and laboratory findings prove that previous gastrojejunostomy was not justified.

DR. ANDREWS Ill-results which frequently follow indiscriminate gastric surgery Technic employed in endoloy gastrojejunostomy in present case. Indications for closing gastro-enterostomy stomas. Types of operation employed for this purpose.

DR. CHARLES LOUIS MIX The patient, J C. B presented himself at Mercy Hospital January 5 1920 with the following history

When he was eighteen years of age he had a severe attack of measles from which he did not recover until two months had elapsed. Following this attack he began having seizures of pain in the left iliac region, coming on every year at about the same time. At first the attack lasted for only a week or two and was relieved by such medicine as the doctor would give him. During the seizure the pain was constant, burning in character and was relieved by eating. Associated with the pain was the belching of a tasteless, non-acrid gas. Though the belching relieved the sensation of distention it did not relieve the pain. Nausea was not present and the patient never vomited.

As the years went on the attacks became worse and of longer duration, until three years ago when an attack came on which did not pass away at all. The pain was of the same character but more severe and was not relieved by eating It was relieved by pressure, this fact indicating that the pain was largely

due to spastic contraction of the circular muscle-fibers of the bowel. The medicines which had been previously used now had no effect. The pain continued daily until November 1917 when the patient visited a surgeon, who without giving an x ray examination and without making a gastric analysis, said that he had "ulcers and a fallen stomach" and that he must be operated upon. He accordingly submitted to operation on November 17 1917. At that time a gastrojejunostomy was made and he was told that the stomach was raised.

Following the operation the patient has never had a well day. He began almost at once to have pain in the hypogastrium and epigastrium. This pain has gradually become less severe as time has gone on, and at the present time is more annoying than painful. Another fact which the patient has noted is that he has what he calls explosive bowel movements of mucus. Previous to his operation his bowel movements had always been regular and normal, but following the operation he became constipated, and it was impossible to empty his bowels except by enemata. After enduring the discomfort from November 1917 to December 1918 he consulted a physician, who began treating him for mucous colitis. By dieting, treatment, and discontinuance of the enemata his colitis became gradually better.

His health continued more or less bearable until June or July of 1919 when further treatment seemed to be of no use. At that time he says his bowels became cramped and that the soreness in his abdomen increased. On drinking liquids he declared he could hear them rush down through his bowels. About four or five weeks ago he began to develop pain in the left epigastrium, burning in character and at times rhythmic, again indicating that it was due to spasm of striped muscle-fibers. The pain had no relation to the taking of food, was constant and sharply localized, not radiating into the thorax. The pain grew gradually worse, and of late there has developed a soreness in the lower abdomen. His appetite is good, but he is afraid to eat, and he has lost more than 20 pounds in weight. There has never been cough or expectoration or pain in the thorax. He has no shortness of breath, no precordial pain, no

palpitation, no swelling of the feet or ankles, no increased frequency of micturition, no nocturia, and no night-sweats. There have been no lightning pains or girdle sensations, no diplopia, no headaches, or cerebral symptoms. He does not sleep well on account of his abdominal pain.

There is no history of either gonorrhea or syphilis. Neither has he in his past history any signs pointing to the existence of either of these venereal infections. Aside from the measles which has been reported, he has had no other previous illnesses except chicken-pox and mumps during childhood. His habits have always been good. He drinks three cups of tea, no coffee, wine, or alcoholics. He does not use tobacco Most of his life he has worked out of doors.

The family history is marred by the fact that his mother died of pulmonary tuberculosis. His father is living and well, now sixty-four years of age. He has three half-sisters and three half-brothers, none of whom are ill. He is married, but has no children. Cross-examined as to the health of his mother's family he said that he understood that several of them died of consumption.

Such a history necessitates a careful exploration of the abdomen. Two facts stand out prominently the first is that he suffered from some defect in the left iliac region which led to the erroneous diagnosis of ulcer and to the operation of gastrojejunostomy The second fact is that the gastrojejunostomy which was done was not successful, because dating from it his health has been extremely bad. Though he does not vomit and is not nauseated, his story is suggestive of the possible establishment of a vicious circle. He was accordingly given a Rehfuss test-meal. The specimens were taken at half-hour intervals, with the following results (Fig. 296)

Blood examination showed 5000 white cells per cubic millimeter 5,080,000 red cells, and 80 per cent. hemoglobin. Two analyses of feces showed blood to be present in both specimens with the benzidin test. On the other hand, the Weber test on the same specimens was negative. Urinalyses, of which two were made during his brief stay were both negative. He was

next taken to the x-ray laboratory where a fluoroscopic examination was made. The striking thing was the abrupt disappearance of the barium into the bowel. It apparently did

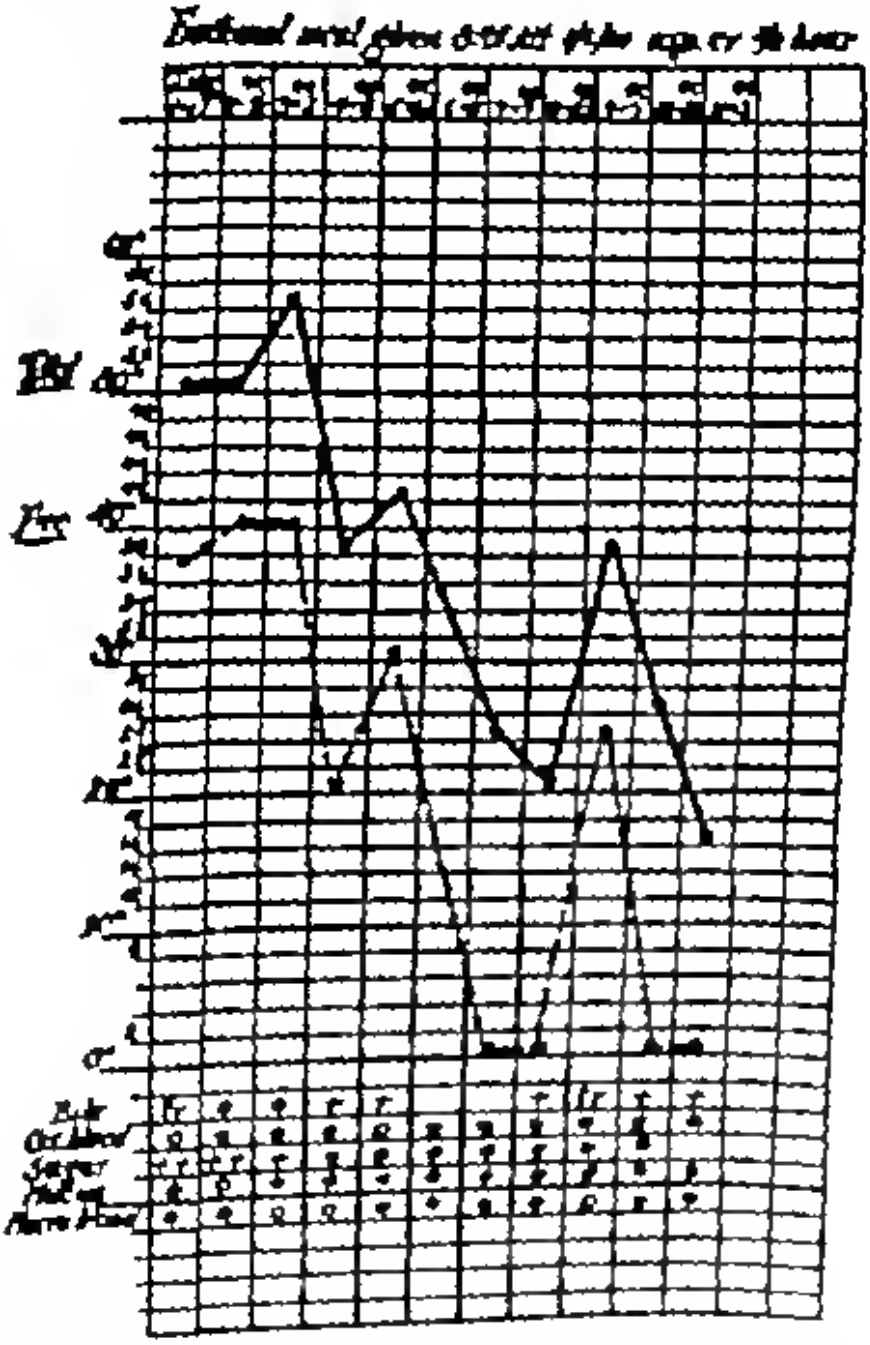

Fig. 296.—Chart showing results of Rehfuss test-meal at half-hour intervals

not lodge in the stomach at all, but passed instantly from the stomach into the intestines. A picture was attempted but before it could be made the barium was out of the stomach. It was necessary to repeat the test on the following day and a

skiagraph was made while the patient was actually drinking the barium mixture. In this way we succeeded in getting a skiagram showing a portion of the pylorus. It was difficult to tell absolutely whether a pylorectomy had been performed when the gastrojejunostomy was done, but inasmuch as we found in the plate evidences of the pylorus, we concluded that the main difficulty was rather at the gastrojejunal orifice.

In addition to the disturbances which the patient had in his stomach we found by injecting the colon with barium from below that there were binding adhesions in the descending colon which were the cause of the original pain in his left iliac fossa and which led to the unfortunate operation. We explained to the patient the nature of his difficulties stating that it would be necessary to remove the adhesions which prevented his descending colon from properly emptying and filling and that it would also be necessary before his health could be re-established to undo the gastrojejunostomy operation. We explained to him further that the opening was so great that his stomach no longer acted as a food reservoir a digestive chamber but immediately dumped its contents into the lesser bowel.

The patient left the hospital but returned in a week, stating that he was ready to have the operation performed. He still complains of the burning in the epigastrium coming on immediately after eating more or less constant pain through the whole of his abdomen, and a splashing noise which takes place when he drinks liquids. This splashing noise he also describes as a growling movement which becomes worse when he lies down at night.

Operation and Lecture by Dr Andrews.—Gastric surgery is sometimes worse than a failure. Certain operations, unadvisedly performed, may result in very positive derangement of the digestive function not existent before.

We have a problem in this patient of undoing by operative interference the surgical work done in his digestive organs two years ago which has resulted disastrously to his digestion. He is progressively losing weight, and so far from being relieved by his surgical operation has been in every way made worse by it.

next taken to the x ray laboratory where a fluoroscopic examination was made. The striking thing was the abrupt disappearance of the barium into the bowel. It apparently did

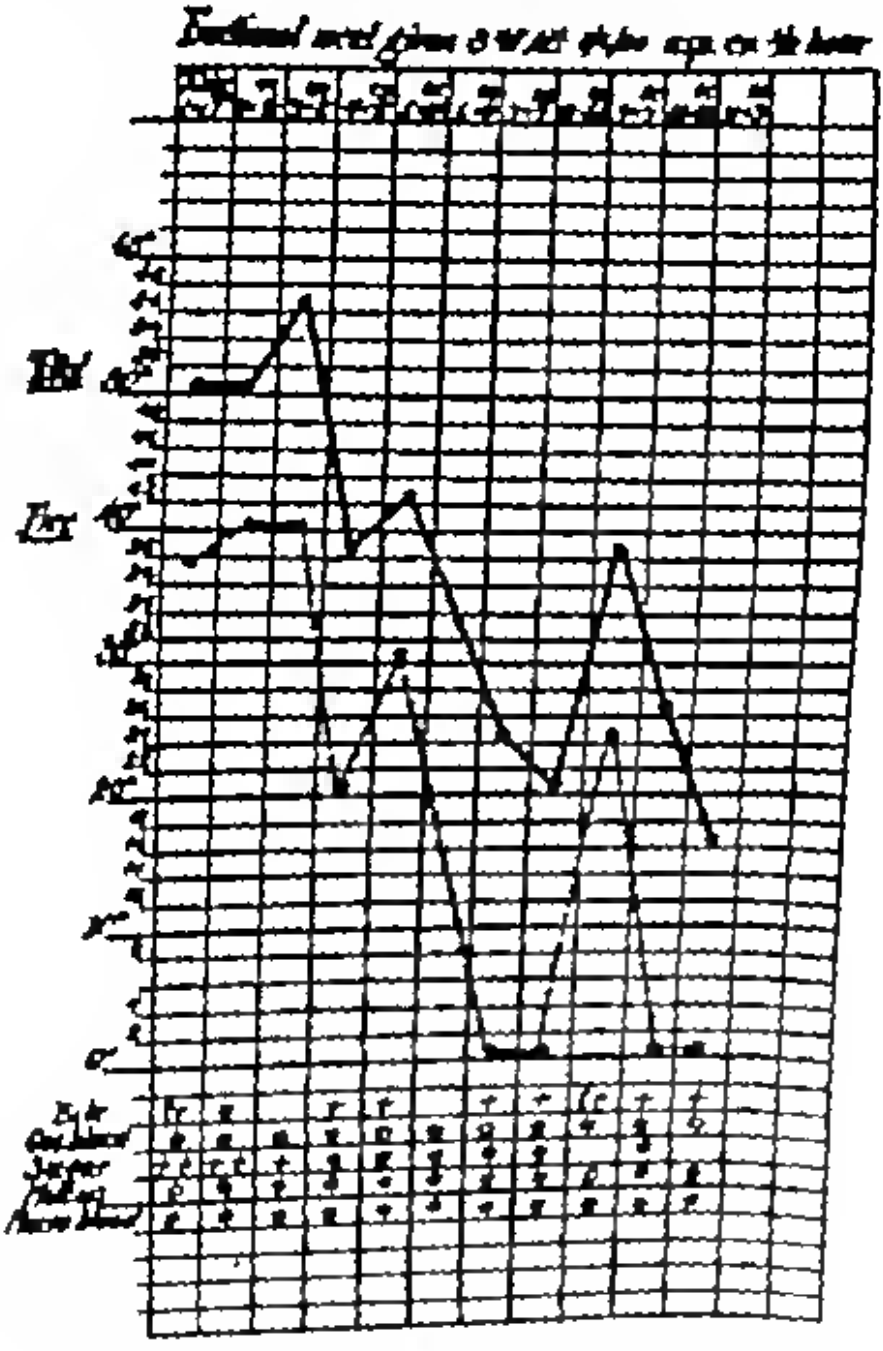

Fig. 296.—Chart showing results of Rehfuss test-meal at half-hour intervals

not lodge in the stomach at all, but passed instantly from the stomach into the intestines. A picture was attempted but before it could be made the barium was out of the stomach. It was necessary to repeat the test on the following day and a

there being no semblance of sphincteric control over this large orifice Hence I have applied the term "dumping stomach to this, fortunately rare deformity

What shall we say of the pylorus itself? No trace of the pyloric cap is present, and we do not know whether the pylorus was excluded or resected or left alone. The precise form of operation we perform will depend upon this factor If no pylorus remains, provision must be made in some way If a normal one is found, we may hope entirely to close up the false opening which we suspect never was needed.

On opening the abdomen we see at once that there is a normal looking patulous pylorus with no adhesions or signs of pathology in gall-tracts or pancreas. On lifting the colon the transverse mesocolon can be separated from the point of anastomosis and both viscera seen and freed. The simple problem of severing this union and restoring the continuity of each hollow viscus is to be solved as nearly as possible by reversing the steps of a gastro-enterostomy As you see the same clamps can be used No one can doubt the importance of sacrificing only the stomach wall, so as not to narrow the bowel by suturing and inversion. This means that the line of section should encroach about 1 cm. on stomach wall, leaving that much on the bowel side. You will note that the stomach mucosa is normally pink or gray in color and that the bowel mucosa is fiery red and inflamed. I have always noted this, and ascribe it to the irritating effect of the acid peptic juices. We cannot wonder that jejunal peptic ulcers sometimes form at this point. What we do not precisely know is how far along the intestine this disturbance follows. It is to be assumed that the mingling of normal alkaline duodenal fluids soon neutralize the acid just as they do below the pylorus. You will observe that I am doing this operation with the common rubber-covered stomach and bowel clamps but it is proper to state that another technic is preferred by one of us (E. A.) who believes that a more cleanly and equally rapid method is to use two Mayo crushing clamps, exactly as in pylorectomy cutting between them and sewing

We are accustomed to see failures follow indiscriminate gastric surgery Sometimes a stoma is wrongly placed or is too small or kinks and spurs and vicious circle or jejunal peptic ulcer render the work of no a ail. Sometimes temporary benefit is followed by gradual recurrence from closure of the new stoma, especially if no pyloric exclusion is practised. Sometimes gastrojejunostomy is a failure because it never was so clearly a surgical indication as some other procedure, such as resection, pyloroplasty or even dietary or medical treatment.

We see many such failures, and are often beseeched by suffering patients to restore them to their former condition by disconnecting and closing the false opening It is rare, however that we see so frank and imperative an indication for doing this as this man presents. It is an opportune time, therefore, to present some of our ideas as to the best technic for doing this as suggested by our experience.

I will say that the operative work is not difficult or tedious, and can be done by two contrasting methods which will be presently described, each of which has its advantages.

I will first describe the man s present condition and history leading up to it. Dr C. L. Mix has carefully analyzed all his symptoms and finds evidence that the stomach has little digestive capacity There is pain and anorexia, but not m ch vomiting The fluoroscope and x-ray pictures are such as I never saw before. The stomach has such a large stoma into the bowel that it literally dumps its whole contents instantaneously In ther words its retention is *nil* No sooner is the barium meal swallowed and the table elevated than the whole meal escapes through the huge stoma which you see in the plate. Only by using the fluoroscope or photographic plate instantly or within thirty seconds can anything be seen in the stomach at all. Exactly the opposite fault is more often encountered, viz. a tendency to spasmodic or organic closure of the stoma, so that the pylorus gets no relief. In fact one of the most surprising things in gastric surgery is the way a stomach will can close a false opening temporarily or permanently retaining the stomach contents long enough for gastric digestion. Here the condition is reversed,

with the usual double row on each viscus. Thus we may either use a closed clamp or an "open clamp" method.

While, of course, we regard resection as a more capital operation than gastro-enterostomy it does not follow that the one step of division between clamps is any more severe or less rapid In fact as the number of these cases increases, as seems likely in the future, the "closed clamp" method may prove safer and more rapid Even when the pylorus has been occluded it is not difficult by a plastic to reopen it

Two very positive indications have been presented to us for closing gastro-enterostomy stomas

1 "Dumping stomach. We find no other term which will describe a postoperative condition in which the stomach has so large a stoma that it literally dumps its whole contents instantaneously into the bowel in other words its retaining power is *nil* In one such case the fluoroscopic examination showed the whole barium meal falling through the stoma in thirty seconds. It was so nearly instantaneous that the tilting fluoroscopic table could hardly be raised quickly enough to observe or photograph any of the opaque mass still in the stomach. This patient had progressive emaciation, pain, and anorexia. Others have the same phenomena in less extreme degree.

2 Vicious circle and bile accumulation in the stomach causing persistent vomiting

3 Finally we have had to deal with neurotic and psychic individuals, persons with exalted reflex excitability who imagine their jejunostomies have done them harm instead of good This is the class we are reluctant to treat surgically without objective evidence of structural derangement. Some of them were physicians who have gone the rounds of many clinics. Some are neurasthenics who rush to any new idea offering prospect of relief Not all such persons should be indulged in their obsessions

Fig 297.—Open clamp method 1 Rubber-covered clamps on stomach and jejunum, stomach being severed about 1 cm above its union with jejunum. 2, Marked difference in appearance of mucosa of stomach and jejunum. Note red and inflamed jejunal mucosa, while that of stomach is normal. 3 Mucosa of stomach stump has been closed by continuous running suture Muscular and serous edges are being approximated by interrupted sutures

Fig 287

Under these limitations it is fair to say that a considerable percentage of stomach cases will be found who have been made worse, not better by "drainage" operation, and must have their surgical work undone before cure is possible. It is humiliating that in doing this we are only correcting surgical mistakes but there is no want of candor or fairness in our attitude, since we admit that our own cases may be among those criticized.

Broadly speaking when gastrojejunostomy has been a failure or an injury to the digestive functions it may be assumed that it never was indicated. The best way to avoid additional mistakes is to insist upon prolonged and scientific analysis of all the factors in such cases in collaborations with internists and stomach specialists in a hospital. These cases are even more liable than ordinary ones to mistakes from hasty judgment and insufficient objective evidence or lack of proper laboratory tests

The previous error should warn us to regard each case as carrying dangerous possibilities of further blunders. Eliminating all errors and doubtful cases, we still find a residue of proved examples of harm from faulty surgery It is the purpose of this clinic to show operative steps as worked out in our clinic, and to demonstrate that the method is safe rapid, and of unfailing benefit. The problem is the simple mechanical one of closing a false opening between two hollow viscera with or without separating them from each other in the quickest, most aseptic, and bloodless manner possible. We have been able to do this with three somewhat different types of operation

1 Open clamp method or "reverse gastro-enterostomy"

2 Closed clamp method of angiotribe and cautery division.

3 Stomaplasty

1 "Reverse gastro-enterostomy" or open method (Fig 297) was our first and is perhaps our best method on account of its mechanical fitness, speed, and safety The steps are an exact

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Fig 296.—Closed clamp method 1 Stomach divided between two crushing clamps bout 1 cm above suture t Jejunum. 2, Stump of stomach being closed by over-and-over suture. The raw edges are then infolded by second suture 3 Operation completed. The jejunum has been closed in the same manner as described in the open clamp method

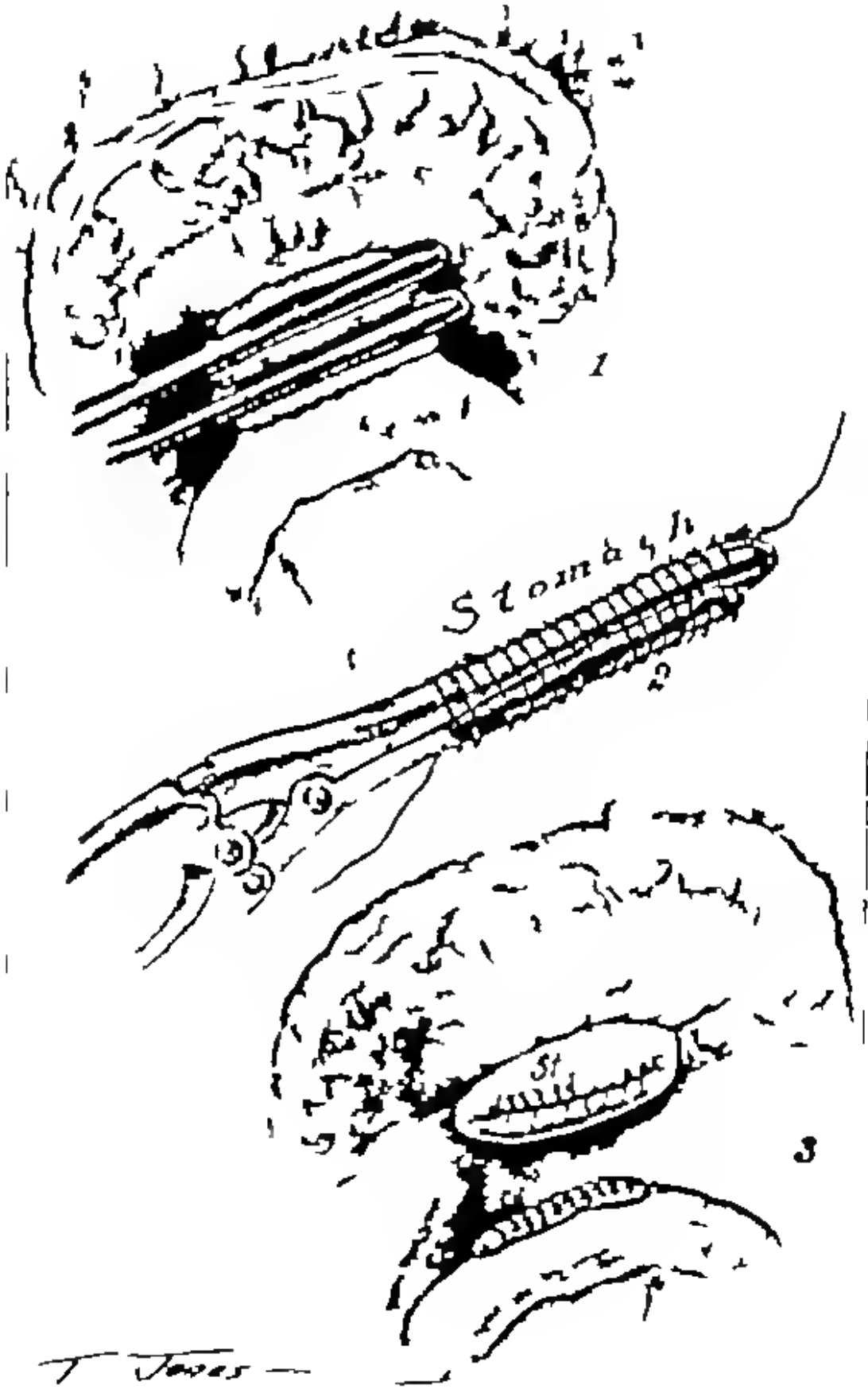

Fig 398.

reversal of the ordinary gastrojejunostomy with certain precautions to avoid stricture of the small bowel. After lifting the transverse colon and exposing the anastomosis, rubber covered clamps are placed on each viscus the whole problem is now so to disconnect and repair the jejunum as not to leave it strictured. This would be inevitable were one to divide the stoma along the old suture line and then close it by the ordinary inversion. To avoid this we make the section upon the stomach wall 1 cm. away from the line of anastomosis. This means that a cuff of stomach wall will be left entirely around the false opening in the bowel. The fact of sacrificing this amount of stomach wall is of no consequence, but the value of the cuff is apparent when we begin to close the jejunal defect, for this "cuff" of stomach wall is just sufficient to close it by inversion with no narrowing of its lumen.

2 Closed method (Fig. 298) As an alternative method, to make the operation more absolutely aseptic, one of us (Dr E. A.) employed Péan clamps as in pylorectomy This enables us to divide both organs without exposing the cavity of either It is a sterile operation except along the cut edges. If we make the divisions with the cautery or with the knife followed by the cautery we have a technic theoretically more aseptic.

A practical difficulty was found in one case in the lack of available space for placing the two clamps. In other cases it was found easy of execution. It is easy if necessary to free the stoma line from the attachment to the mesocolon.

3 "Stomaplasty" (Fig. 299) or plastic closure of part of the stoma to reduce its size is indicated in some cases which have had pyloric obstruction either from disease or operation. We may have to choose between operation to restore the pylorus or to repair the stoma. It is a simple and easy procedure but our experience is too limited for very positive conclusion as to value and permanency

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Fig. 299.—Stomaplasty: 1, Stomach and jejunum, held by rubber-covered clamps, are being partially separated by cutting along line of old suture. 2, First row of continuous sutures being applied to close opening. 3, Completed result. Note reduced diameter of gastrojejunal opening

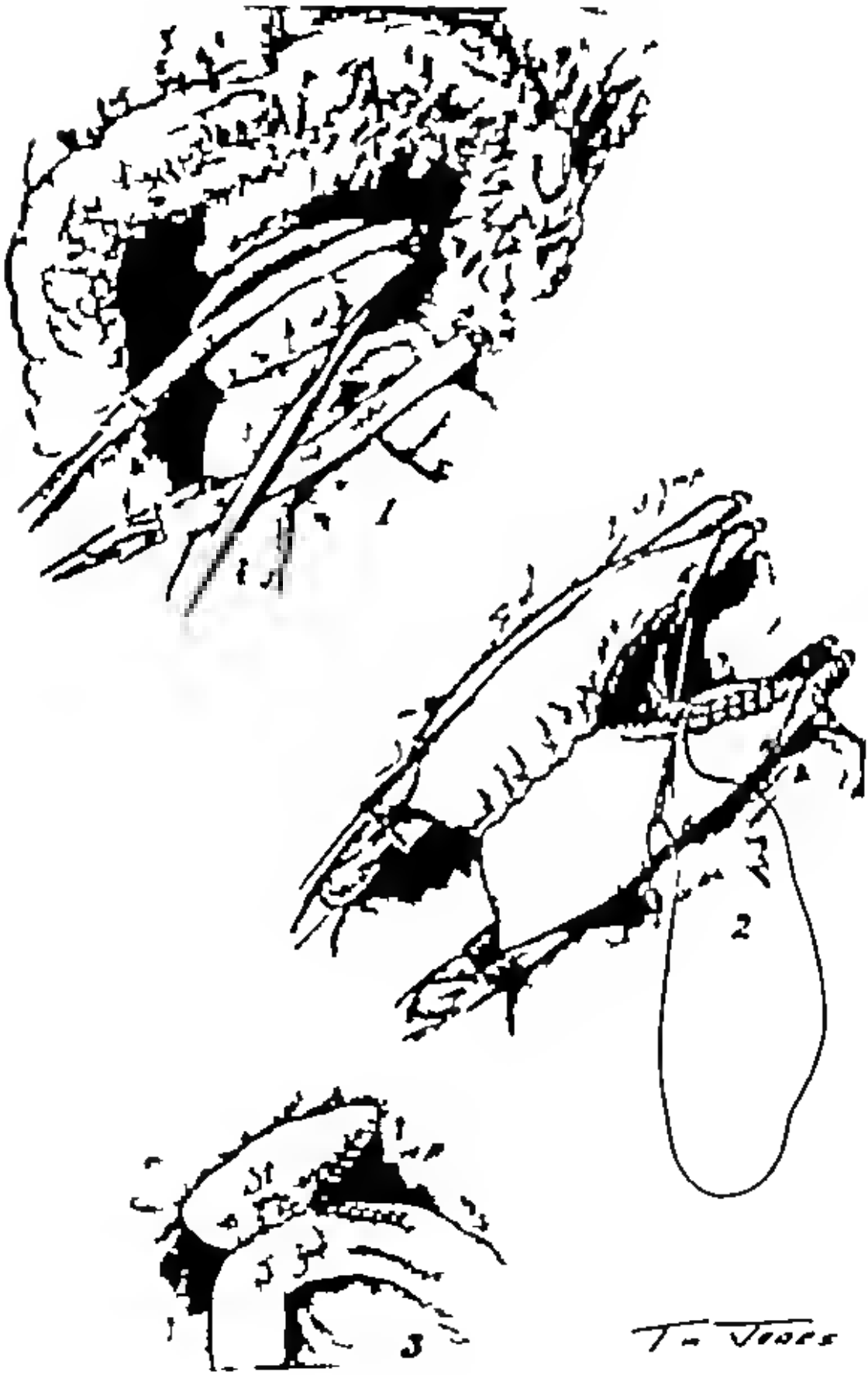

Fig. 293.

CLINIC OF DR. DAVID C STRAUS

Cook County Hospital

PERINEPHRITIC ABSCESS—TUBERCULOSIS OF KIDNEY —SUBCAPSULAR NEPHRECTOMY

Summary: Perinephritic abscess in patient admitted to hospital with diagnosis of tuberculous peritonitis—drainage of pus collection. Post operative cystoscopy ureteral catheterization, and pyelography to determine presence of tuberculosis of kidney Nephrectomy for tuberculosis of kidney—technic—significance of anomalous renal vessels—advantage in difficult nephrectomies of dividing ureter before attempting to expose and ligate renal vessels—treatment of ureter. Discussion on tuberculosis of kidney Prognosis in present case.

The case I desire to present this morning is one of unusual interest from the standpoint of diagnosis, surgical indications, and operative treatment.

The patient, P J., a male laborer twenty-seven years of age, came to my service transferred from the medical service of Dr Charles Spencer Williamson. He was sent to the hospital by Dr Ludwig Loeb, who had seen him on April 12 and 15 1920 He consulted Dr Loeb because of loss of appetite, loss of weight, and weakness. There were no other complaints except some indefinite abdominal discomfort, he had no pain anywhere. These symptoms began insidiously in December 1919 without any apparent cause and were gradually progressive. It was chiefly because of the progressive loss of weight and strength that he became worried. The first time Dr Loeb observed him his temperature was 99° F., and on the second visit it was 102.6° F His abdomen also was rather distended, and there was some diffuse tenseness of the abdominal wall, with some slight indefinite abdominal discomfort, though no localized area of tenderness and no real pain. Dr Loeb sent the patient to the Cook County Hospital, suspecting a possible tuberculous peritonitis.

Conclusions.—1 Closing safe and often indicated.

2. It should become a standardized operation, and will remain so as long as the indiscriminate use of gastrojejunostomy is persisted in as a cure-all for digestive trouble.

3. To avoid danger of even this becoming a routine in the hands of uncritical men.

4. Three methods (*a*) Simple "reverse gastro-enterostomy (*b*) exclusion by crushing clamp cautery etc., (*c*) plastic operations for partial closure of the false opening.

Postscript.—In a personal communication from the patient dated March 19 1920 he writes, "I am walking a little easier every day and that is sure saying something for me. I am feeling fine and could not be any better with the exception of my bowels. They bother me some, but I think they will be all right in a short time, as they were overworked for a long time. My wound has been healed over for about two weeks now and is getting better every day I can eat almost everything without any trouble or pain in my stomach. That sure is fine, to my notion. It seems to me as if I had been born over as a new man—no more of those exciting times in my bowels. I almost forgot to tell you I gained 20 pounds since I came home."

ities were emaciated, but were otherwise normal. All reflexes were normal. Blood-pressure was 110 systolic, 85 diastolic. Examination of the urine showed specific gravity 1014, reaction acid, albumin present in considerable amount, sugar absent. Microscopic examination showed the presence of hyaline epithelial and amyloid casts, many pus-cells and an occasional red cell. An antiformin test was negative for acid-fast bacilli. Examination of the stool was entirely negative except for the presence of a positive Weber test. Antiformin tests of the stool were negative for acid fast bacilli. A second stool examination gave the same findings. The first two stools gave a positive Weber test. In a third examination the Weber test was negative. Sputum examination showed total quantity scant, color gray general appearance purulent. Microscopic examination showed the presence of leukocytes various organisms, but no evidence of any tubercle bacilli. A blood count made the day of admission showed 16 000 leukocytes another count made two days later showed 22 000. A differential count made the day of admission showed small mononuclear lymphocytes 5 per cent. large mononuclear lymphocytes 2 per cent. polymorphonuclear neutrophils 92 per cent. The temperature varied from 97° F. in the morning to 100° F. in the evening, the pulse varied between 92 and 120. The respirations varied between 20 and 30.

On April 20th the patient was sent to the *x*-ray department for roentgenologic examination of the chest for a suspected empyema. The report of Dr. Blaine reads: No definite *x* ray shadow evidence of an empyema is present. A slight clouding is seen in the right lower pulmonary area, which may be an early degree of such a lesion but no accumulation of exudate is present at this time. It is noted that the height of the thorax is materially decreased, apparently by abdominal pressure. The right diaphragm is definitely higher than the left. (Fig. 300.)

On April 22d a diagnostic puncture was made in the ninth intercostal space in the midaxillary line with negative result. A second puncture was made in the tenth intercostal space about midway between the scapular line and the vertebral column directing the needle downward. 2 cm. of thick pus were aspirated.

On entrance into the hospital April 19 1920 his chief complaints were loss of appetite, loss in weight, weakness, pain in the abdomen, expectoration, and fever The diagnosis made in the admitting room was suspected pulmonary tuberculosis. In addition to the above facts in regard to the onset of his trouble he stated that last December his appetite became poor but he kept at work until the middle of February when he had pain in his limbs and joints, especially on motion. The joints were not red or swollen. This "rheumatism" lasted until the middle of March, when he began to have dull pain in the abdomen, which has been continuous since. The pain was not sharp, was not definitely located, and did not radiate. He had been confined to bed more or less continuously since the middle of February He had been chronically constipated, but otherwise had not noticed any abnormality of his stools, never noticing any blood or mucus.

His previous history is negative except for the fact that he had typhoid fever eight years ago and had his left testicle removed five years ago because of a discharging sinus. His habits have always been moderate and he denies ever having had any venereal infection. His family history is negative for tuberculosis.

Physical examination on admission showed the following as the more important findings. The patient was anemic looking emaciated, and appeared weak. The head and neck showed no abnormal findings. Examination of the chest showed dulness over the entire right lower portion of the chest below the fifth rib, both anteriorly and posteriorly and this dulness was continuous with a liver dulness. Harsh breath sounds were heard over the left and right apices. The right apex was contracted the breath sounds were distant, and occasional dry rales were heard. The heart findings were entirely normal. Examination of the abdomen showed tenderness all over but especially marked over the liver region, and the lower margin of the liver was one and one-half fingerbreadths below the costal arch. The spleen was not palpable. Neither kidney was palpable. Genital examination showed the absence of the left testicle All extrem-

Examination of a direct smear showed no organisms in the pus, and a stain for tubercle bacilli was negative. Cultures also were sterile.

On April 24th the patient felt weaker had dull pain over the right side of the lower chest. This pain was increased on deep inspiration. His appetite was very poor and he appeared very septic. A diagnosis of subphrenic abscess was made and the patient transferred to my surgical service.

When I first saw the patient the findings were about the same as those recorded in the medical department.

As the patient's condition was such that immediate drainage seemed indicated, it was deemed wisest to resort to operation at once rather than to delay in attempting to make a refined diagnosis as to the exact etiology of the pus collection. In a recent clinic[1] I discussed in detail the various possibilities as to the location of pus collections beneath the diaphragm and the source of the infection in the case of right and left subdiaphragmatic abscesses, so that I will not go over these again in detail. In this case it was impossible from the clinical examination or the roentgenologic findings (Fig 300) to determine with certainty whether the pus was located in the subdiaphragmatic space, in the liver or in the retroperitoneal tissues about the kidney

The condition was believed to be either a liver abscess or a subdiaphragmatic abscess either from a liver abscess or from a low-grade appendical abscess, or a perinephritic abscess from a tuberculous kidney possibly but much less likely a tuberculous abscess from a spinal caries. The fact that the pus removed on puncture was sterile suggested either a tuberculosis of the kidney or bone, or an amebic liver abscess, and rather definitely spoke against a subphrenic abscess from a perforative appendicitis. Furthermore, there was no history or findings suggestive of an appendical lesion.

The diagnosis of perinephritic abscess secondary to tuberculosis of the kidney was seriously considered for the following

[1] Subdiaphragmatic Abscess—Transpleural Drainage of a Case Due to Abscess of the Liver The Surgical Clinics of Chicago, 1920, pp. 377–400.

Fig. 300.—Roentgenogram of chest and upper abdomen taken April 20th, while patient was still on the medical service, ruled out suspected empyema and determined, if possible, the cause of the dulness in the lower portion of the right chest. The dulness was continuous with the liver dulness and extended up as high as the fifth rib both anteriorly and posteriorly. No evidence of empyema is present. The height of the thorax is materially decreased on both sides, apparently due to abdominal pressure. The right diaphragm (*D*) is definitely higher than the left (*D'*). Not the localized dense shadow immediately below the medial half of the right diaphragm occupying an area more or less elliptic in outline extending from about the middle of the diaphragm to the spine. The right phrenicocostal sinus (*P*) is clear—no evidence of fluid.

out that it differs from an ordinary joint tuberculosis, that it does not show the usual anatomic changes of tuberculous arthritis. He believed it to be a tuberculous polyarthritis due either to the presence in the joint of a very few tubercle bacilli or tuberculous toxins. When the rheumatism is caused by the presence in the joint of a very few tubercle bacilli he assumed that these are of such low virulence and are so few in number that they are unable to call forth the usual specific tuberculous changes in the joint. When the condition is due to the presence of a toxin produced by tubercle bacilli elsewhere, this reaches the joint through the blood-stream and causes local changes which differ from an ordinary tuberculous arthritis. While a few tubercle bacilli have been found in the joints in some of these cases, it is now generally assumed that the rheumatism is ordinarily due to the presence of toxins alone that it is a toxic polyarthritis. Clinically this tuberculous rheumatism may run either an acute or chronic course. Several subtypes are described. One of the acute types, tuberculous arthralgia, corresponds exactly to the symptoms this patient described. It commences without apparent cause as vague drawing pains, particularly in the larger joints, is aggravated by motion, and is characterized by the absence of any objective findings, such as redness or swelling of the joints, and by the fact that it disappears as it comes on without any apparent cause. It travels from joint to joint and, as a rule, several joints are affected simultaneously

While the above facts made us think strongly of the possibility of a perinephritic abscess secondary to tuberculosis of the kidney however the absence of any bladder symptoms, frequency incontinence, pain, etc. the absence of any pain in the region of the kidney and the absence of any tenderness over the kidney rather spoke against tuberculosis of the kidney and the extremely high position of the diaphragm and liver made us suspect that we were probably dealing with a primary condition in the liver

Although the patient did not give a history of any previous attack of dysentery we believed it was very likely that we were dealing with a case of amebic liver abscess. We know that not infrequently an amebic liver abscess may follow long after an

reasons The location of the increased density in the roent genogram (Fig 300) being near the median line and rather well circumscribed, seemed suggestive, though its high location and the extremely high position of the diaphragm seemed unusual for a subphrenic abscess secondary to a perinephritic abscess. The fact that the pus removed by aspiration was sterile also suggested tuberculosis, although the site from which it was aspirated left one in doubt as to whether it might have come from a perinephritic abscess, an abscess of the liver or a subphrenic abscess. Also the finding in the urine of albumin, pus, and blood suggested tuberculosis of the kidney However the absence of tubercle bacilli in the urine and the presence in the urine of epithelial, granular and amyloid casts, which are not ordinarily present in tuberculosis of the kidney unless there is an associated nephritis, which is unusual, made it impossible to determine whether the urinary findings were due to pathology primarily in the kidney itself or were secondary to pathology elsewhere. Of course, we know that the absence of tubercle bacilli in the urine does not at all rule out tuberculosis of the kidney for they may be present in certain specimens of urine and absent in others, or in cases where the ureter is obstructed the only urine passed may be from the healthy kidney Other facts pointing toward a diagnosis of tuberculosis of the kidney were the retraction of the left apex, which was very suggestive of an old pulmonary tuberculosis and the probability that the discharging fistula in the scrotum was due to tuberculosis of the testicle, and it was because of this that the testicle was removed. Furthermore, the "rheumatism that the patient described as having had in his limbs and joints was extremely characteristic of a tuberculous rheumatism, in that it came on without any apparent cause last February was so severe that it compelled him to stop work and remain in bed until the middle of March, and at the same time the joints showed no objective findings, being neither red nor swollen, and finally that it disappeared as suddenly as it came on.

A French clinician, Poncet, first described this condition in 1896, and called it "rheumatisme tuberculeux. He pointed

the bladder and ureteral orifices examined, ureteral catheterization performed, and the urine from each kidney separately examined, chemically and microscopically the usual functional tests made, and a pyelogram made of each kidney But as the patient's condition had grown progressively worse during his short stay in the hospital and as the site of the pus had been determined, it seemed imperative to drain the abscess without delay and determine the cause of the abscess at operation, if possible, or else postpone the determination of the exact etiologic factor until the patient's general condition would warrant the necessary examinations. Accordingly preparations were made to operate the patient the following morning.

Operation (April 26 1920).—As the pus aspirated by the medical department had been recovered from a puncture made in the tenth right intercostal space at a point about midway between the scapular line and the line of the spinous processes of the vertebræ, directing the needle somewhat downward, and as the local findings had not changed, as soon as the patient was anesthetized I made a diagnostic puncture in the eleventh intercostal space directly below the point of the previous puncture. With the needle directed perpendicularly to the skin no pus was encountered. Accordingly the needle was next directed downward, and at a depth of perhaps 2½ inches pus was at once encountered. An assistant was directed to hold the needle in place. Believing that if the pus was in the subphrenic space or in the liver itself the abscess could be reached parapleurally that is, by going below the pleura and then through the diaphragm, I decided to resect the twelfth rib lift the pleura upward, and then go through the diaphragm. Accordingly an incision was made along the twelfth rib from just lateral to the erector spinæ muscle to its extremity cutting directly down upon the rib boldly cutting through the overlying muscles. The twelfth rib was then completely resected, subperiosteally from its extremity to within a few centimeters of the spine. Next, at a point near the erector spinæ muscle and well below the pleural reflection, a diagnostic puncture was made, pus encountered, and then an incision made down through the overlying soft parts until the abscess cavity

attack of amebic dysentery which was so slight that the patient had forgotten it. The extremely insidious onset, dating back to last December the absence of any symptoms except loss of appetite, loss of weight, and weakness, together with a leukocytosis of 22,000 and enlargement of the liver upward as high as the fifth rib anteriorly and posteriorly together with tenderness on pressure over the liver area, and the low irregular fever made the diagnosis of liver abscess seem most probable. Furthermore, the fact that no tubercle bacilli were found in the urine rather spoke against the diagnosis of tuberculosis of the kidney although, as I pointed out before, these need not always be found present in the urine at any particular examination, or even on repeated examinations in case there is a stricture of the ureter As against the diagnosis of amebic abscess of the liver it was realized that amebic abscess rarely occurs in the lower posterior portion of the right lobe near the median line. You will remember that we considered in detail the location of amebic liver abscess in the clinic I referred to before. But, on the other hand it is most unusual for a perinephritic abscess to show such a high position of the diaphragm. A tuberculous abscess due to a tuberculosis of the spine (Pott's disease) was also considered, but the fact that there was no rigidity of the spine and no tenderness on pressure over the vertebra rather ruled this out. As against a perinephritic abscess, although by no means ruling it out, were the facts that the right kidney was not palpable, that there was no tenderness on pressure over the kidney area, and that there was no edema of the soft parts in this area. We know however that in tuberculosis of the kidney the findings on palpation vary widely in different cases. Early before any perinephritic adhesions have occurred, the kidney is often felt to be enlarged, shows respiratory mobility and on deep inspiration can be ballotted. Later if perinephritic adhesions have occurred and these very often develop about the upper pole fixing the kidney high up, the kidney may no longer be palpable even on deep inspiration and even though it is definitely enlarged.

Had the patient's general condition warranted the delay required I would have had the patient examined cystoscopically

dressings were applied. The patient left the table in good condition.

The exact etiology of the abscess could not be determined at operation, but it was believed that this would be possible when the reports from the smear culture guinea pig inoculation, and tissue examination were returned. Unfortunately the piece of tissue removed for examination was lost.

Following the operation the patient's general condition improved, he was more comfortable, and had a better appetite. However he still ran an irregular temperature, though this did not rise as high as it did before the abscess was drained. Also there was less abdominal discomfort, but he still had some distress from tympanites. On April 29th five days after the operation, the leukocyte count was 22,000 just the same as it has been before the abscess was drained. By May 7th the leukocyte count had come down to 15,000 and a differential count showed polymorphonuclear neutrophils were now 90 per cent. By May 15th the leukocyte count had fallen to 9400 and a differential count showed that the polymorphonuclear neutrophils had fallen to 80 per cent.

When the patient's condition had improved sufficiently to warrant further diagnostic examinations he was sent to the x ray department to determine whether there were any changes in the local findings, and in particular to study the liver and diaphragm The report returned by Dr Blaine reads "The right diaphragm as well as the left diaphragm are seen to be very high, reducing the height of the chest and causing a transverse position of the heart. The pulmonary areas are negative. This corresponded to our clinical findings, and seemed to be chiefly due to the tympanites.

As the patient's general condition now seemed sufficiently improved to warrant a cystoscopic study this was ordered, because I still considered the possibility of a perinephritic abscess secondary to a tuberculosis of the kidney

The first cystoscopic examination showed that there were no abnormal findings in the bladder except that the right ureteral orifice gaped somewhat. A shadowgraph ureteral catheter was

was reached. There was considerable edema of the deep tissues and these were so adherent to one another and altered by inflammatory changes that it was impossible to determine their exact identity and this was not long attempted. No suggestion of perinephritic fat was encountered. The right index-finger was now introduced into the abscess cavity several septa present in its lower portion were broken down, and the entire abscess was converted into a single simple cavity. This was about the size of a goose-egg and its long axis was vertical, as was indicated by the dense shadow in the roentgenogram (Fig. 300). The abscess cavity extended almost to the median line, in front of the spinal column, just as the x-ray plate had indicated (Fig. 300). Its walls were smooth, except below where the septa had been encountered. Careful palpation failed to show any suggestion of an osseous focus in the vertebræ and no rough bone was to be felt. A tuberculous bone focus with a resulting psoas abscess had been considered but could not be made out. The cavity contained several ounces of thick slightly greenish-yellow pus, which had a foul penetrating odor reminding one of a colon infection. A sample of pus was sent to the laboratory for smear, culture, and inoculation into a guinea-pig. The abscess cavity was now sponged dry. Its walls were seen to be of a brown color and it was impossible to be certain whether the abscess was in the liver itself or whether the lower roughened part of the cavity consisted of kidney tissue. Accordingly a section of the wall of this lower portion of the abscess cavity was removed for microscopic study.

The cavity now being sponged dry was swabbed out with tincture of iodin and then irrigated with normal saline solution. A large rubber drainage-tube was then inserted down into the bottom of the cavity and was held in place by suturing it to the skin by a single silkworm-gut suture. Two silkworm-gut sutures were inserted through the skin and underlying soft part but were not tied, it being planned to tie these ligatures when drainage was no longer indicated. Plain gauze packing was loosely introduced about the rubber drain to hold this in place and further to prevent the walls of the abscess from closing. Dry

easily inserted up to the pelvis of the left kidney but a similar catheter introduced into the right ureter met an obstruction that could not be passed.

The patient was returned for a second ureteral catheterization, but here, again, it was impossible to introduce the right ureteral catheter up to the renal pelvis, and no urine came away through this catheter

He was returned for a third ureteral catheterization on May 22d. Here, again, the first two attempts to pass the obstruction in the right ureter were unsuccessful, but finally a wax ureteral catheter was passed beyond the obstruction, although it could not be introduced as far as the renal pelvis, due to an apparent marked narrowing of this upper portion of the ureter A shadowgraph catheter was now introduced into the left ureter as far as the renal pelvis.

Ten c.c. of silver iodid were now injected through the wax catheter in the right ureter and a roentgenogram including both kidneys and ureters, was taken.

This plate (Fig 301) shows most graphically the pathologic conditions present.

A shadowgraph is seen inserted in the left ureter The tip of this catheter has reached the usual height, indicating the position of this kidney to be normal. No opaque solution is seen on this side.

On the right side the wax catheter can be more faintly seen Its tip reaches only about as high as the lower pole of the right kidney as indicated by the arrow Above this the greatly narrowed ureter is seen filled with opaque solution, which appears as a fine line of irregular width and leads up to the renal

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twelfth rib and in contact with the twelfth thoracic vertebra. The safety-pin passing through the rubber drainage-tube introduced into the abscess cavity at the time of operation overlies this collection, so that it is perfectly apparent that this was the abscess drained at the operation and that it was perinephritic abscess secondary to pathologic kidney in all probability cavernous tuberculosis of the kidney Note the presence of the twelfth rib on the left side and the absence of the twelfth rib on the right side, this having been resected at operation. *N* pathology is noted in the twelfth thoracic or the lumbar vertebræ.

Fig. 301.—Pyelogram of right kidney with roentgenogram showing ureteral catheters in both ureters. A shadowgraph catheter is seen inserted in the left ureter. The tip of this catheter has reached the usual height, indicating the position of this kidney to be normal. An opaque solution is seen on this side. On the right side the ureter catheter can be more faintly seen. Its tip reaches only about as high as the lower pole of the right kidney, as indicated by the arrow. Above this the greatly narrowed ureter is seen to be filled with opaque solution, which appears as fine lines of irregular width and leads up to the renal pelvis. This, similarly is seen reduced to a narrow lane of irregular width, and from it fine lines radiate to several isolated, large, more or less circular collections of opaque media, corresponding to and typical of hydrosalpinx as seen in pyonephrosis of the kidney. From the upper one of these hydrosalpinx like collections of opaque media leads to the region immediately above the kidney where the majority of opaque media injected has collected in a more or less circular cavity at the height of the

ward, toward and almost to the anterior superior spine of the ilium (Fig. 302, 1) cutting carefully down to the muscles and lumbar fascia until the kidney was reached. No perirenal fat was present. The kidney was firmly adherent everywhere to the surrounding structures. Then cutting the kidney capsule from one pole to the other the line of the incision being just posterior to the lateral convex border of the kidney the capsule was shelled off the anterior surface of the kidney and then from the posterior surface by blunt dissection with the finger Due to the long-standing infection and perinephritic abscess which had been drained at the primary operation, the capsule of the kidney was greatly thickened and was firmly adherent to the surrounding structures, and in particular to the peritoneum over the ascending colon (Fig 302, 2) Great care was exercised not to open into the peritoneal cavity and this was not done. On exposing the kidney tissue by reflecting the capsule, its surface showed here and there small miliary abscesses. In addition, it was seen that at the primary operation one large abscess at the upper pole had been opened and drained This was clearly where the disease had perforated the kidney causing the perinephritic abscess. The entire kidney showed a lobulated formation, reminding one of fetal lobulation but it was clear from the roentgenogram (Fig. 301) that this was caused by the presence within the kidney of a linear series of large abscesses. By carefully continuing the subcapsular exposure (Fig 302, 2) first the upper and then the lower pole was freed, attention being directed to find any polar vessels, but none were present. In the performance of nephrectomy no matter by what method or route, it is important to remember the great frequency with which anomalous renal arteries are found, either at the upper or lower pole. Only too often operators, failing to notice or control bleeding from these vessels, which they have torn because they have not recalled their presence, have been embarrassed by very serious and even fatal hemorrhages. In a study of the kidneys in 100 cadavers—*i. e.* 200 kidneys—to observe the frequency of accessory renal arteries Dr Eisendrath and I[1]

[1] Jour Amer Med. Assoc., October 15, 1910, vol. lv pp. 1375–1377

pelvis. This, similarly is seen reduced to a narrow line of irregular width, and from it fine lines radiate to several isolated large, more or less circular collections of opaque media, corresponding to and typical of abscess cavities in the kidney. From the upper one of these abscess cavities a line of opaque media leads to the region immediately above the kidney where the majority of the opaque media injected has collected in a more or less oval cavity at the height of the twelfth rib and in contact with the twelfth thoracic vertebra. The safety-pin passing through the rubber drainage-tube introduced into the abscess cavity at the time of operation overlies this collection, so that it is perfectly apparent that this was the abscess drained at the operation, and that it was a perinephritic abscess secondary to a pathologic kidney—in all probability a cavernous tuberculosis of the kidney. The roentgenogram also shows the presence of the twelfth rib on the left side and the absence of the twelfth rib on the right side, this having been resected at the first operation. No pathology is noted in the twelfth thoracic or the lumbar vertebræ.

A urinalysis made on May 17th showed specific gravity 1020, reaction acid, albumin present, no sugar and a centrifuged specimen showed a few granular and hyaline casts, pus-cells, and an occasional red cell.

Ever since the time of operation considerable pus had been draining from the drainage-tube introduced at that operation.

As it was clear that the right kidney was a severely damaged pus kidney riddled with large abscesses, the indication was unquestionable to remove it at once. Accordingly this was arranged for and carried out on May 26, 1920.

Second Operation. Nephrectomy.—With the patient lying on his left side, and with the special kidney elevator attached to the operating table elevated to its full extent, so as to widen as much as possible the space between the last rib and the crest of the ilium on the affected side, an incision was made from the medial extremity of the old incision, over the twelfth rib at the outer border of the erector spinæ muscles outward and down-

found true accessory arteries in 14 per cent. of the cases. The accessory renal arteries were found as follows

	In 200 kidneys.
Accessory arteries (true)	28, or 14 per cent.
Superior polar arteries from single renal (pseudo-accessory)	19 or 9.5 per cent.

The following types of true accessory arteries were found

	In 200 kidneys.
Two separate arteries from aorta to hilus	14, or 7 per cent.
Inferior polar artery directly from aorta	7 or 3.5 per cent.
Superior polar artery directly from aorta	5 or 2.5 per cent.
Four renals directly from aorta	1 or 0.5 per cent.
Inferior polar artery directly from left common iliac	1 or 0.5 per cent.

Dr Eisendrath[1] has recently reported the findings in 218 additional kidneys. This makes a total of 1237 kidneys examined by various investigators up to date, showing that true accessory renal arteries occurred as follows

	Per cent
Upper polars from aorta	0.5
Lower polars from aorta	nearly 0.6
Lower polars from iliacs	04
Superior polar arteries from single renal (pseudo-accessory—in 418 kidneys)	16

Having freed the two poles, the ureter was next sought and found. It was greatly enlarged, especially near the pelvis, and

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when the capsule is firmly adherent to surrounding structures. Note that the kidney has been shelled out from its capsule, which remains in situ. Note also that the kidney cannot be drawn out through the operative incision, so that the entire operation has to be performed in the depths of the wound. After doubly ligating and dividing the ureter the vascular pedicle can be more easily exposed and is ligated en masse. A clamp is then applied between the ligatures and the hilus and the vascular pedicle divided. The kidney is now removed, and the stump of the ureter is stitched into the lower angle of the wound. 3, Drawing of kidney removed at operation. Note that the kidney is devoid of its fibrous capsule except near the hilus. Note also that the kidney which was somewhat enlarged, shows lobular contour reminding one of fetal lobulation. This appearance is due to the localized bulging of the surface caused by the caseous, cavernous tuberculous abscesses within, shown in Fig 303. Several subcapsular abscesses (Ab.) are plainly to be seen

[1] D. N Eisendrath Annals of Surgery lxxi, No. 6, pp. 726–743, June, 1920.

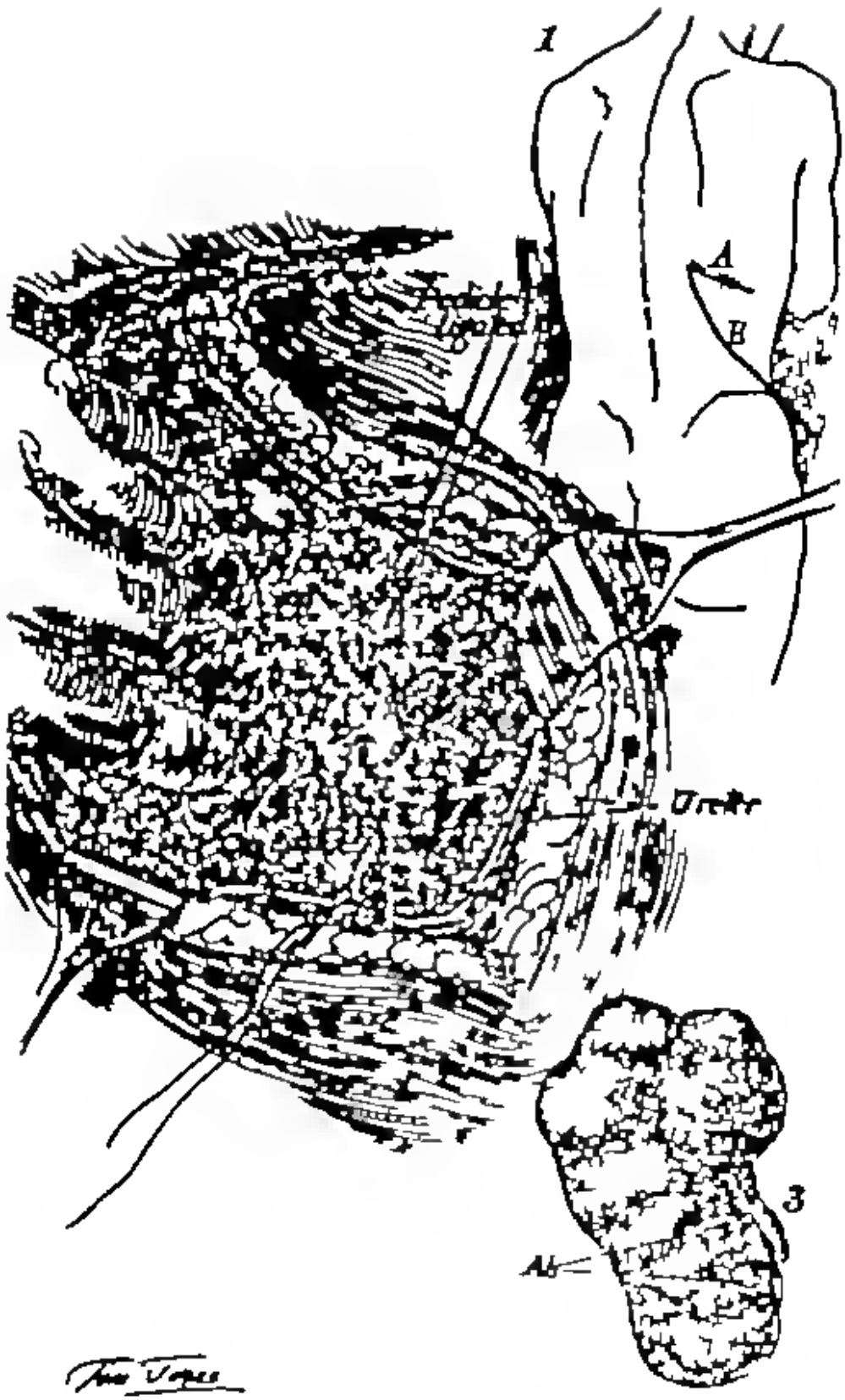

Fig. 302.—1, Diagram showing (*A*) the incision made at the first operation, through which the twelfth rib was resected subperiosteally and the pus collection was drained; (*B*) incision made at second operation for nephrectomy. 2, Diagram showing technic of subcapsular nephrectomy, which is indicated

primary mortality It is now generally abandoned. Since that time most surgeons treat the ureteral stump by merely stitching it into the lower angle of the incision, just as I did, so that it lies easily accessible for future local treatment in case this should become necessary At the time of operation some surgeons attempt to cauterize the entire ureteral mucous membrane by means of injecting caustics, such as pure phenol, or by swabbing it out with phenol by means of a small applicator attached to a long sound. In addition to this method Kümmell sometimes uses an actual cautery to destroy the lining mucous membrane, and he has had a special long delicate cautery point constructed for this purpose. He introduces the cautery into the ureter cold, then has the electric current turned on, and when the cautery has become hot slowly withdraws it. He also uses this method for the treatment of stubborn postoperative tuberculous ureteral fistulæ. Clinical experience has shown, however that when once the tuberculous kidney has been removed the local disease in the ureter tends, as a rule, to heal spontaneously Kümmell sutures the stump of the ureter into a separate stab incision in the abdominal wall, made slightly medially and below the incision through which the kidney has been removed with or without complete closure of this original incision.

As much of the renal capsule as could be easily cut away was removed, but the major part remained behind. The cavity was now cleaned of blood and remains of renal pus, and then swabbed out with iodin. An iodoform gauze drain was inserted in the upper angle of the wound, another placed in the lower angle, and a rolled gutta-percha drain placed along the ureter reaching almost to the bladder bleeders ligated, and the wound closed up to the drains, using a few interrupted chromic catgut sutures for the deeper layers and lumbar fascia, and then several interrupted silkworm-gut stitches going through the skin muscles, and fascial layers. Dry dressings were applied. The patient left the table in very fair condition. He was given 1000 c.c. of normal saline solution subcutaneously below the breasts during the course of the operation, and another 1000 c.c. were ordered given as soon as he reached the recovery ward.

its walls were very greatly thickened. The ureter was now doubly clamped near the lower angle of the incision, ligated doubly with chromic catgut, and divided between the ligatures (Fig. 302, 2). The cut surface showed that its lumen was greatly narrowed (Fig. 302, 2).

Probably the best method of dividing the ureter is by means of an actual cautery because it accomplishes at the same time sterilization of the lumen, and thus guards against infection of the wound. In this case it was not deemed indicated, as he already had a large abscess around the kidney from escaped kidney contents.

I would like to call your attention at this time to the great advantage in any case of difficult nephrectomy of dividing the ureter before attempting to expose and ligate the renal vessels. When the ureter is divided the kidney has a greatly increased range of mobility and it is far easier now to take care of the vascular pedicle. Next, attention was directed to expose the hilus and the renal vessels, and when these had been well exposed the vascular pedicle composed of the renal arteries and veins was ligated *en masse* using No. 3 chromic catgut. A second similar *en masse* ligature was then applied. A curved clamp was applied proximal to the ligatures and the vascular pedicle divided. The hemostasis was absolute. Next the stump of the ureter was followed down with the finger to the bladder care being taken not to separate it too freely from the surrounding tissues so as to interfere with its blood-supply but no collection of pus came upon anywhere. Then the ureteral stump was stitched to the lower angle of the wound, so that any discharge later might be well drained away.

The question of the treatment of the ureter has been the subject of considerable discussion, especially in the past. At one time it was deemed advisable to resect the ureter close to the bladder as it was believed that in this way any late complications on the part of the ureter would thus be prevented most effectually. Experience, however, did not prove this to be the case. It did not prevent the development of the occasional postoperative fistula and was accompanied by a higher

portion of the cortex. On section the cortex is seen to be greatly thinned and the parenchyma is replaced by a series of large abscess cavities, typical caseous, cavernous, tuberculous abscesses. These large cavities are for the most part filled with caseous material, though some of them are partly filled by fat which has grown in. The pelvis shows its walls to be very greatly thickened and its lumen is reduced to a mere slit, which is no larger in caliber than the upper portion of the strictured ureter (see Fig 301)

A section of the kidney was sent to the laboratory for histologic study and the report returned is as follows

"Microscopic preparations stained with hematoxylin and eosin. This kidney presents typical tubercles with giant-cells and infiltrating mononuclears. In acid-fast preparations the bacillus of tuberculosis is demonstrated in these tubercles. (Signed) Stangl.

The patient's condition following operation has gradually but progressively improved, and he no longer complains of the constipation and tympanites that formerly distressed him almost continuously and was his chief complaint in addition to his loss of appetite, weight, and strength.

No doubt you are all aware that tuberculosis of the kidney may first manifest itself clinically in one of the six following ways

The most frequent type of onset is with slowly developing loss of strength, loss of weight, almost always accompanied by emaciation and characterized by the *insidious onset and progressively increasing bladder disturbances* The bladder is irritable and there is an increased frequency of the desire to urinate, especially at night. When this frequency has once become established it rapidly becomes worse, and in case the desire to urinate is not promptly gratified, cramping bladder pains set in. Gradually emptying the bladder becomes painful and there is a severe burning pain at the beginning and even more at the end of micturition. The latter often continues for some time after the completion of the act, accompanied by a feeling of cramp-like pressing in the bladder as if some urine remained behind which ought to be expelled. Incontinence of urine, especially at night,

The kidney (Figs. 302, 303) is somewhat larger than normal, shows lobulation suggestive of fetal lobulation, but which is due to the distention of the contained abscesses, is almost com-

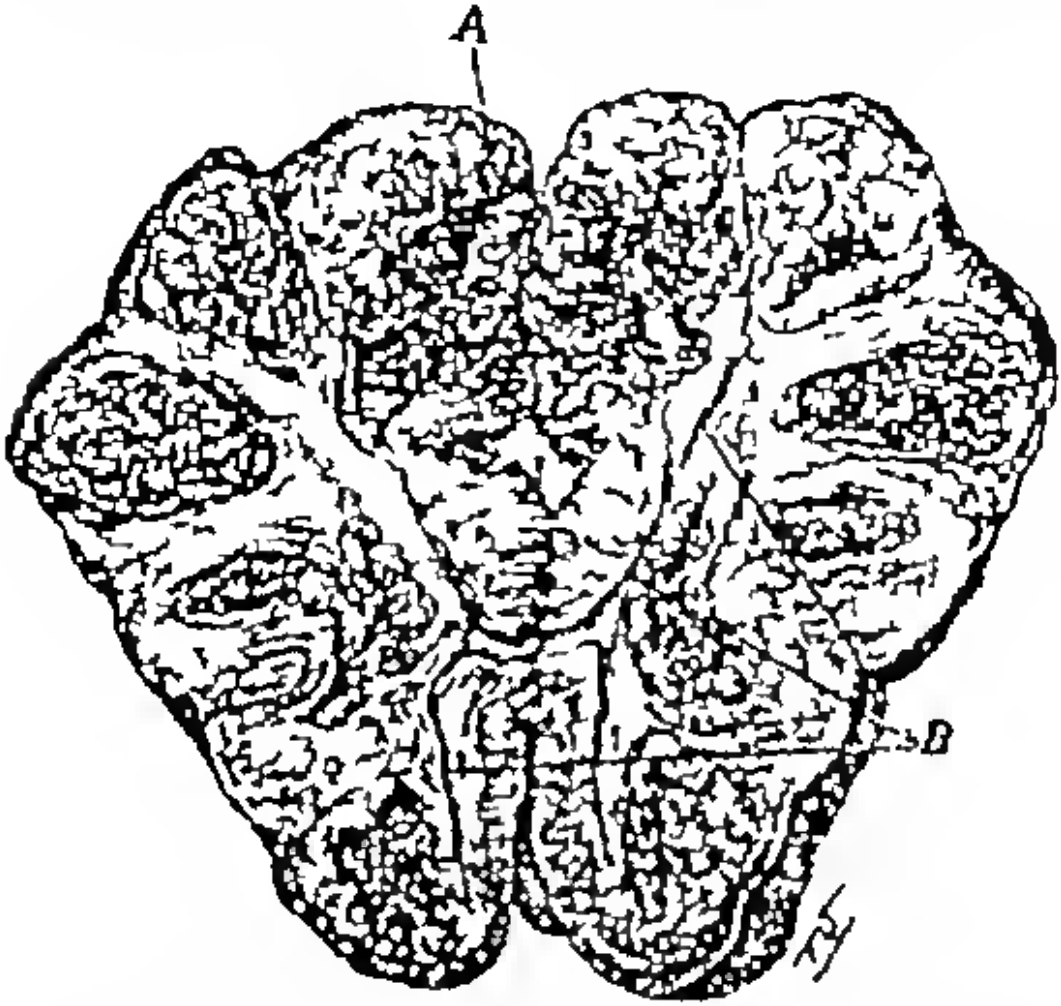

Fig. 303.—Dorsal half of kidney cut open. This shows typical caseous, cavernous tuberculosis of the kidney. The kidney is somewhat enlarged, and shows a picture resembling one of fetal lobulation, but this is the result of the large discrete abscesses within the kidney. These abscesses are almost filled with caseous tuberculous material, in part also by fat which has grown in. The cortex of the kidney is greatly thinned over the abscess cavities. The site of perforation is seen at *A*, here the abscess at the upper pole eroded through the cortex, resulting in the perinephritic abscess. The renal pelvis (*B*) is extremely narrow and is surrounded by old sclerotic connective tissue. The findings correspond exactly to those shown in the roentgenogram (Fig. 301).

pletely stripped of its capsule except near the hilus. Its surface is smooth for the most part, though here and there larger and smaller subcapsular abscesses are seen as yellow spots standing out in marked contrast to the general dusky red color of the main

local symptoms on the part of the kidney This type of onset also occurs, according to various observers, in from 40 to 60 per cent. of the cases, though this type of onset probably is not so common as the one just described. Wildbolz[1] found this type of onset in 43 per cent. of his cases.

These symptoms on the part of the kidney consist of a dull, aching pain in the kidney colicky pains, and tenderness on pressure. The pains may remain limited to the kidney for a long time, or even always. As a rule, however they are followed after a longer or shorter time by bladder symptoms as those just mentioned. As a rule the kidney symptoms develop slowly and progressively more rarely with great severity Ordinarily the patient first complains of dull, drawing pains in the affected kidney and these are unrelated to exercise or jarring of the body in contrast to the pain caused by renal calculi. Gradually the intensity and frequency of the pain increases. It often assumes a neuralgic character In case the symptoms set in acutely it is usually in the form of severe, colicky attacks simulating a renal colic due to stone, and like it, the pain often radiates downward along the ureter toward the bladder and at times also to the external genitalia. Such colicky attacks are often caused by a momentary obstruction of the ureter by blood coagula or masses of caseated detritus. These colics may recur at longer or shorter intervals and may accompany the dull localized pains just referred to Küttner has taught that the urine should be examined for tubercle bacilli in every case of renal colic, and this teaching is well founded when one considers the frequency with which tuberculosis of the kidney is accompanied by renal colic.

Tenderness on pressure over the kidney is an important symptom in this type of onset. A tuberculous kidney may often show no changes on palpation. Early in the disease the kidney is not enlarged, but later some enlargement almost always occurs. For this reason it is often easily palpable in the hypochondrium, especially on deep inspiration. However if as often occurs, perinephritic adhesions develop early and these most commonly

[1] Wildbolz: Chirurgie der Nierentuberkulose, Neue Deutsche Chirurgie, Band 6, 1911.

is often present in this type of onset, indeed, it may be the very first symptom of a renal tuberculosis. This occurs particularly in children, but also often in adults. Whenever one has to deal with a case of incontinence of urine it is essential to consider tuberculosis of the kidney. The commonest bladder symptom in this type of onset is the decreased capacity of the bladder. In case a patient with this type of onset is treated under the diagnosis of an ordinary cystitis, one is struck by the fact that the bladder shows an unusual irritability to distention with fluid, is extremely tender on contact with any instrument introduced, and quite conspicuously in contrast to an ordinary cystitis, which usually shows a decrease in symptoms following irrigations with a mild silver nitrate solution, the bladder is extremely irritable to even the mildest silver nitrate solutions. This decreased capacity of the bladder is not always the result of anatomic changes in the bladder wall, but in some cases is the result of the reflex action of the diseased kidney on the intact bladder. This type of onset with bladder symptoms is the most characteristic and occurs according to various observers in from 40 to 60 per cent. of the cases. Any case which is being treated as one of ordinary cystitis, which does not promptly respond to the usual general and local treatment, should make us suspect tuberculosis of the kidney. One should then feel compelled to carry out the usual diagnostic procedures—cystoscopy, ureteral catheterization, etc. When the local treatment seems to aggravate rather than diminish the bladder symptoms, it should make us particularly suspect tuberculosis of the kidney. When one has to deal with an ordinary case of cystitis a smear made from the sediment of a centrifuged specimen of urine will usually show the presence of the ordinary pyogenic organisms. In case no organisms at all are found, or only bacilli, and especially if these are found to be acid fast by the usual carbolfuchsin stain, it is essential to carry out ureteral catheterization and the usual examinations of the urine from each kidney separately—microscopic, chemical, functional tests, guinea-pig inoculations, etc.

The *second most frequent type of onset* is that in which there are

tuberculosis of the kidney and many other facts pointed strongly toward it. On the other hand, when tuberculosis of the kidney has existed for a long time, amyloid changes can take place in the kidney just as they do in other organs, and then amyloid casts will be found in the urine, as was noted in this case.

Probably *the third most frequent type of onset* observed clinically is the sudden appearance, without any apparent cause of a severe hematuria. Braasch has recently stated that this occurred in about 25 per cent. of his cases. In general, however this mode of onset probably does not occur in quite so high a percentage of cases. In every case of sudden hematuria of unknown etiology it is important to rule out tuberculosis of the kidney

Fourth, as a very rare occurrence, it may be pointed out in striking contrast to the above three types of onset, that the disease may run an entirely symptomless course and it has been repeatedly observed that a cavernous, caseous tuberculosis has been diagnosed in a patient in whom no kidney pathology has been suspected. Albuminuria is often the very earliest symptom of tuberculosis of the kidney and may exist for months before any other manifestations are evident. Every case of albuminuria of unclear etiology must be regarded as a possible tuberculosis of the kidney until this has been definitely disproved.

A *fifth type of onset* is one in which the first symptoms of the disease of the kidney are those of a perinephritic abscess. The case may have run a symptomless course until this complication occurred. This is a particularly common complication in children. At times in children as well as in adults the symptoms of a perinephritic abscess are the first symptoms of the presence of a tuberculosis of the kidney In the case under consideration, as you will remember the patient had no subjective symptoms except the loss in weight, appetite and strength when he first consulted a physician, and only later did the vague abdominal symptoms develop which are explained by the development of the perinephritic abscess. This had as its main symptoms the vague abdominal discomfort and the tenseness of the abdominal wall, together with meteorism, constipation, and an in

occur about the superior pole, the kidney may be held high upward, and it is not palpable even on deep inspiration. Even if the kidney is not palpable, pressure by the palpating hand causes pain. This tenderness on pressure is particularly marked over the renal pelvis and often elicits a painful desire to urinate. This tenderness of the kidney to pressure often elicits itself as a definite tenseness of the abdominal wall, and this latter may rarely be the only local expression of the disease of the kidney just as occurred in this patient. But it must be remembered that at times all the above local kidney symptoms may develop in the healthy kidney The enlargement and tenderness on pressure may be the result of a compensatory hypertrophy of the healthy kidney The enlargement may be so great that the kidney may be easily palpable and this rapid enlargement may be associated with considerable tension of its fibrous capsule, so that the kidney may be tender on pressure. Furthermore, colicky pains may be limited to the healthy kidney either as a result of compensatory hypertrophic changes in the healthy kidney or as a result of reflex pains referred from the diseased to the healthy kidney just as occasionally occurs in the case of renal colic due to stone in the kidney At times stones may be found in the tuberculous kidney and the colics may in these cases be attributed to the presence of a stone.

In addition to the excretion in the urine of albumin, pus, and blood, there may be the symptoms of a nephritis, with the excretion, in addition to the foregoing, of epithelial and granular casts, just as occurred in this case. But these symptoms of nephritis are unusual in tuberculosis of the kidney Dieulafoy reported that he saw only 2 or 3 deaths from nephritis in 300 patients suffering with tuberculosis of the kidney and Wildbolz observed only 2 cases of nephritis in 260 patients suffering with tuberculosis of the kidney As I mentioned before, it was the finding in the urine of epithelial, granular and amyloid casts in addition to the absence of any bladder symptoms or tenderness over the kidney that made me suspect that we were dealing with some condition in the liver rather than with tuberculosis of the kidney although we realized that this did not at all rule out

CLINIC OF DRS ARTHUR DEAN BEVAN AND L. C. GATEWOOD

PRESBYTERIAN HOSPITAL

MESENTERIC FIBROMA

Summary Patient giving history of having had an abdominal tumor for sixteen years. Repeated exploratory operations fail to reveal true nature of tumor Examination by Dr L. C. Gatewood—fluoroscopic findings—diagnosis. Operative treatment. Frequency of mesenteric tumors—solid tumors of mesentery for the most part benign. Points to be borne in mind in the removal of these tumors. After-history of present case.

THIS patient whom I am presenting to you this morning has a long and very interesting history Sixteen years ago he came to this clinic when it was in charge of Professor Nicholas Senn and I was Associate Professor of Surgery He came with a large abdominal tumor of uncertain pathology Senn studied the case for some time and came to the conclusion that an exploratory would be necessary in order to make the diagnosis certain. He made a large midline incision extending from the umbilicus to the symphysis, and exposed the tumor which proved to be partly solid and partly cystic. At the time of the operation Senn found that he could definitely outline the spleen, which was quite normal, and he could feel the right kidney which was also normal. He came to the conclusion that the large tumor was a tumor of the left kidney The patient was not doing very well under the anesthetic and he closed the exploratory wound except at the upper angle, where he sutured what he believed to be the capsule of the kidney into the wound and tamponed it with iodoform gauze, evidently with the intention of later removing what he believed was a kidney tumor About that time, however he went on a vacation and turned the case over to me, with instruction to do a nephrectomy and remove what he

creased leukocyte count. So that in this patient we had a combination of type four onset associated later with a type five onset. It may be well to point out at this time that various combinations of types often occur

A *sixth type of onset* consists of an onset with chills, fever and sweats in addition to any of the above types, and this occurs when we are dealing with a case of mixed infection.

Finally as regards the prognosis in this case it is difficult at this time to make any definite statement, as it is impossible to be certain whether or not there are tuberculous foci elsewhere. An examination of the urine at this time, except by ureteral catheterization, is of no particular value in determining whether or not the other kidney is involved. The remaining kidney shows some pathologic changes, but is doing its work satisfactorily and, as you well know changes in the remaining kidney if not too advanced are often greatly improved or disappear entirely after the more diseased kidney has been removed. It was perfectly obvious from an examination of our second roentgenogram, and even before the diseased kidney was exposed, that it was practically an entirely useless kidney and that, due to the high grade of stricture of the ureter no urine coming away through the ureteral catheter that for all practical purposes the disease in the kidney had accomplished a spontaneous exclusion of the organ, so that one could remove it without the slightest fear that the remaining kidney would be insufficient. The right kidney had been worse than useless

Following the nephrectomy most of the patient's abdominal complaints disappeared entirely or were greatly alleviated. He is no longer troubled with meteorism which had distressed him the entire time he was under observation previous to removal of the kidney Furthermore, the general tenseness of the abdominal wall has completely disappeared. While the patient has improved since the kidney was removed, he is still weak, is still emaciated, in spite of the fact that he eats heartily still runs an irregular low fever and does not appear to be improving as rapidly as one would expect if he were suffering from tuberculosis of the kidney alone.

the distress has been associated with a sensation of desire for bowel movement, but has not been relieved by bowel movement, and he has taken frequent cathartics without relief. He has been having three or four small soft or liquid stools per day

Inquiring into the previous history of the patient I learned of the operations of which Dr Bevan has told you. The man states that he had no symptoms from the time he left the hospital in 1904 until early in 1909 when he again noticed a feeling of fulness and pressure and again found a mass in the abdomen. He entered a hospital at that time and an opening was made through the old scar into this mass, some fluid was withdrawn, and for many months the cavity was irrigated with an iodin solution until the wound finally closed. He had no further symptoms and had no knowledge of a mass in his abdomen until the onset of pain three months ago.

In the physical examination there is nothing worthy of mention outside the abdomen. There is an old irregular scar in the middline of the abdomen from the pubes to a point 1 inch above the umbilicus. The abdomen is almost filled by a large, moderately firm, rounded mass about the size of a man's head. It measures approximately 9 inches transversely and slightly less in its vertical diameter The anterior surface of this mass is more irregular than the upper and lateral aspects and the old wide abdominal scar is firmly adherent to it. There is marked tenderness along the left lower aspect of this mass. Rectal examination is negative.

Laboratory findings at the time of original examination were hemoglobin, 80 per cent. leukocytes, 15,600 temperature 99.2° F pulse 100 respiration 18 urine negative. Ewald test meals showed normal secretion and no blood. Feces contained no blood or pus. After two days the temperature was normal and the leukocyte count was 7900 The pain and tenderness in the left lower quadrant had practically disappeared While under observation the patient had one other attack of pain in the left side with slight temperature (99.6° to 99.8° F) lasting two days. No visible peristaltic waves or other signs of obstruction were noted at any time.

thought he had proved definitely to be a tumor arising from the left kidney I followed out his instructions and made an oblique kidney incision on the left side. Very much to my surprise I came down upon a perfectly normal left kidney I found that this tumor was in front of the kidney and in the midline. The tumor was so extensive and of such uncertain character that I made up my mind to leave it alone and turn the patient back to Senn s care on his return. Before Senn returned, however the patient had left the hospital. He came back later with a suppurating area in the midline incision which Senn had made. This was probably three months after my exploratory operation. He was placed on my service. He was very ill, and I contented myself with opening up the abscess in the abdominal incision and draining it.

The patient recovered and left the hospital, and I heard nothing from him until he was again referred to my service a few days ago by Dr L. C. Gatewood, who had studied the case with a great deal of care. Dr Gatewood, from the evidence which he could obtain from the old histories and from a careful analysis of the facts, has come to the conclusion that we have to deal with a mesenteric cyst, and I am undertaking the operation with that diagnosis. I will ask Dr Gatewood to give you the details of the case as he has worked them out.

Dr. L. C. Gatewood This patient presented himself about ten days ago complaining of pain and tenderness in the left lower quadrant of the abdomen. This pain began about three months ago and was associated with a sensation of fulness and pressure. Remembering his previous trouble, he palpated his abdomen and found a large rounded mass occupying a large part of the abdomen. He does not believe that it has changed in size since he first observed it. The pain of which he complains has been intermittent. It has been moderately severe for two or three days at a time and would then disappear almost completely for a few days. The sensation of fulness and pressure has been constant and has gradually become more distressing. It is not influenced by food taking nor by the amount or kind of food eaten. The patient has been moderately constipated and

part of the abdomen and an attachment to the small intestine not far from the ileocecal junction. The position of the cecum is best explained on the basis of traction upward upon the ileum as the mass enlarged. With a mass originating more nearly centrally and not so attached we might expect to find the bowel pushed upward and outward, but would hardly expect to find the colon flexed upward upon itself. The findings upon physical examination and the roentgenologic evidence suggest that this is a fluid-containing mass, and we know that on two previous occasions fluid has been withdrawn from it. In the female there

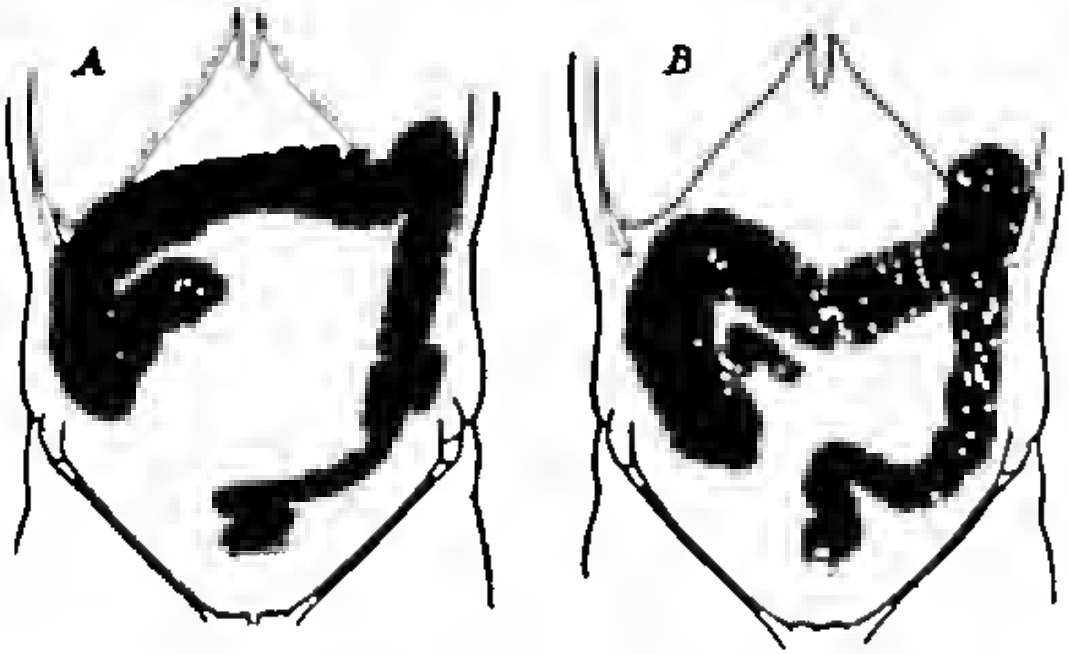

Fig. 304.—*A* Diagram from x-ray before operation, showing marked dislocation of cecum. *B* Cecum in normal position after removal of tumor

are several conditions which might produce or approximate these findings, but there are few benign abdominal tumors occurring in the male which reach such size or which are at all likely to occur in such relation to the other abdominal viscera. Most important of these are the various types of retroperitoneal and mesenteric tumors and mesenteric cysts. I believe that a fluid containing mass of such size and with such findings as I have described is best explained as a mesenteric cyst.

I quite agree with Dr Gatewood that a mesenteric cyst is the probable explanation of the clinical picture which we find in this case.

Upon fluoroscopic examination of the colon the barium clysma entered readily and the colon filled out to normal diameter with no evidence of obstruction or filling defect, and the patient experienced very little discomfort. The colon lies lateral to and above the mass and does not pass in front of it or behind it at any point. The transverse colon is at the level of the costal border and the ascending colon is bent sharply upon itself at a point a little above the level of the crest of the ilium, so that the cecum extends upward and inward to a point near the hepatic flexure. Those parts of the colon not under the costal margin were freely movable and not adherent to the tumor

Fluoroscopic examination of the stomach made the following day showed the stomach in a high transverse position with the antrum behind the transverse colon which could be outlined readily on account of the barium it still contained. The stomach emptied very rapidly the barium in the small intestine being seen above and to the left of the mass. Observations repeated at frequent intervals failed to reveal any of the barium passing across the area occupied by the mass. Plates made after a considerable amount of barium had passed into the small intestine show the cecum turned sharply upward with the ileum emptying into it at a point near the transverse colon (Fig 304 *A*) All of the small intestine is pushed upward to the left or to the right. Both in fluoroscopic examination and in plates the area occupied by the mass shows a shadow of moderate uniform density rather less than might be expected with a solid tumor of such size.

To sum up our evidence, we know that a large ovoid mass is present in the abdomen, that at a time when the same mass or a similar mass was found on exploratory operation it did not involve the spleen nor either kidney and that its course has been benign. We know that it does not communicate with any part of the gastro-intestinal tract in such a way that barium can enter it, and that it has not encroached upon the lumen of the bowel. The way in which the small intestine is pushed into the upper portion of the abdomen and the flexion of the ascending colon and cecum speak for an origin of the mass in the lower

sary for me to dissect it away with a knife and forceps, and in doing this I open into the ileum at one point. I immediately close this with three rows of Lembert sutures. The attachments of the tumor are now entirely free. It has no definite pedicle. I lift it out of its bed and out of the abdominal cavity and pack the huge space from which it was removed with large, dry abdominal pads, which control the venous oozing which is considerable. I have the assistant make firm pressure over these pads so as to control the bleeding This pressure is maintained for several minutes. On letting it up I find that the oozing is not from any large vessels, but from the very large surface on each side of the tumor mass, as large as the palm of my hand. Taking some very fine catgut on a non-cutting needle I sew up the oozing surface with fine catgut, first on one side and then on the other I find, fortunately that this controls the hemorrhage almost completely The appendix was very firmly attached to the tumor and was dissected free from it and lies now without any attachment to its mesenteriolum. I think it would be safer and best to remove it. I do this in the usual way by cutting off and invaginating the stump

In spite of the suturing of the raw surface I find there is still some slight oozing when I remove my pads. I think, on the whole, it would be safer to pack in two pieces of iodoform gauze on to this raw surface and allow them to remain for forty-eight hours. I intend also to put in a couple of cigarette drains. Packing in the two pieces of iodoform gauze about 3 inches wide and about 2 feet long and introducing the two cigarette drains, I now close the abdominal incision. On account of the great length of the incision, in addition to the usual closure I shall use a couple of our favorite button sutures as a means of additional protection. The wound is now closed. My head nurse has already informed me that the pads and sponges are all accounted for The patient is in very good general condition.

Let us now examine this large tumor It feels like an enormous fibroma, and yet, on palpation, it feels cystic. Cutting it open I find that it is probably a fibroma with very thick walls, the center of which has undergone cystic degeneration so that

The patient has been prepared for an exploratory abdominal operation and is now thoroughly etherized. You will see on inspection that the abdomen is filled with a very large tumor as large almost as a pregnant uterus at term, and in about the same location. It pushes the intestinal contents well out of the pelvis and high in the abdomen and in both flanks. I make a very large incision, beginning about 2 inches above the umbilicus and extending down to the symphysis. On opening the peritoneal cavity for the entire length of this incision and holding the edges of the wound apart with retractors, you will see that a very large tumor comes into view. On palpation this seems like a multilocular cyst with very thick walls and looks very much like an intraligamentous cyst. It is bound down and fixed as an intraligamentous cyst usually is. You will remember that we have definite evidence from our previous knowledge of the case that the man has a right kidney a left kidney and a spleen all independent and entirely separated from this tumor. You will remember too, that the tumor has existed for at least sixteen years to our knowledge, that in 1904 it was a large tumor and evidently has not grown very much since that time, and from the clinical history it is evidently therefore a benign neoplasm.

It seems to me that the way to handle this is like we would handle an intraligamentous cyst, to divide the peritoneum that covers it and holds it fixed in position. In doing this I am able to determine pretty definitely that this huge tumor springs from between two layers of the mesentery and I am able to find an avascular area between some of the large blood vessels where I can divide this mesentery and begin to enucleate the growth. I am able to divide the mesentery which covers it to the extent of about 7 or 8 inches, and with my gloved hand I strip the mesentery off from the tumor first the anterior surface then passing it behind and below the line of cleavage which enables me to free the posterior surface of the tumor. Finally I reach the upper pole of the tumor and I am now able to dislodge it and bring it out through the abdominal wall. In doing this, at one point the ileum is so firmly fixed to the tumor that it is neces-

dominal tumors were found to spring from three different anatomic regions, and it was very often difficult to differentiate between these three classes. One is a true mesenteric tumor developing between the layers of the mesentery second a retroperitoneal tumor that looks very much as though it were a mesenteric tumor because it separates the layers of the mesentery and yet it may have developed not from the mesentery but from some retroperitoneal connective tissue, and third, a tumor beginning not in the mesentery but from the intestine, and developing until it assumes the appearance of a mesenteric tumor I think it is well to realize that these solid tumors of the mesentery are, for the most part, benign. I think that that knowledge is most important, because a few years ago in operating upon one of these cases, a young man of about thirty with an enormous abdominal tumor I found that the ileum and cecum were closely attached to the tumor and believing that the tumor was probably malignant I did an extensive resection of the ileum, cecum and ascending colon. This stage of the operation prolonged the operation very much, and was, I believe, the cause of the fatal termination which unfortunately followed. When we examined the specimen we found that it was a pure fibroma, and I believe that if I had known it was a fibroma or thought it was probably a benign tumor I could have by very careful dissection removed the tumor without resecting the intestine. As I look back on the case I am quite sure that the controlling reason for my resecting the intestine was the fear or belief that I had a malignant tumor to deal with and that I would not be giving the patient the best prospects of a permanent cure unless I resected the intestine.

Another point I want to call your attention to is the importance of realizing the anatomic location of the tumor and the importance of having an avascular area in the mesentery and as I told you while we were operating following essentially the same technic that we adopt in removing intraligamentous cysts, dividing the overlying peritoneum that fixes it in position to an extent sufficient to enable us to enucleate the tumor

A third point which I think important is that of injuring as

we find a number of large cavities as big as my fist or half as big as my fist full of fluid (Fig. 305) From the gross appearance I should say therefore that it is probably a fibroma that has undergone a degenerative process resulting in the formation of these cysts in the central portion of the tumor We shall not, however be able to make an absolute diagnosis until we make a microscopic examination of the specimen.

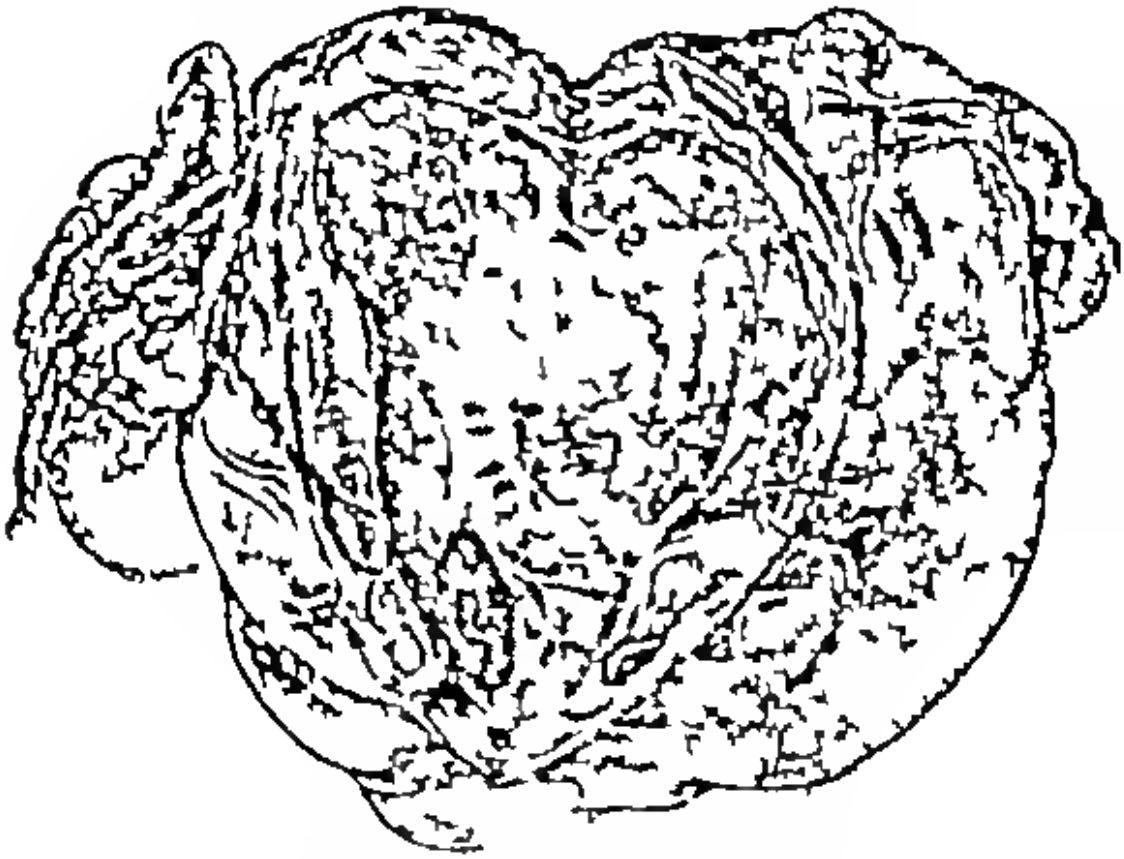

Fig 305.—Appearance of tumor after removal.

I want to take this opportunity of saying a word or two in regard to these large mesenteric tumors. We have had three or four of them on our service They are not common In a recent article from Finsterer's clinic one of Finsterer's assistants analyzed very carefully the literature and found some 60 cases of solid mesenteric tumors reported. The majority of these were fibromata some were lipomas some were fibrosarcomas few had undergone myxomatous degeneration and a few were out spoken sarcomas. In analyzing the literature these huge ab-

CLINIC OF DR. ARTHUR DEAN BEVAN

Presbyterian Hospital

DISLOCATION OF PATELLÆ

Summary Recurrent dislocation of patellæ present for many years. Various operations devised for the relief of this condition. Technic in present case—postoperative dressing.

The patient upon whom I shall operate this morning is this young woman, twenty-six years of age, who comes to my service with the statement that she has a dislocation in both knee caps that this condition has existed for ten or twelve years, and that when she was a child she had no trouble of this kind, but that it came on when she was twelve or fourteen years of age. It came on without a history of injury She gives this description of the trouble She may be walking along turn her foot slightly or twist the limb slightly will have a sudden, severe pain in the knee, and fall to the ground. She feels something slip in the knee, and on pulling up her dress she finds that the knee cap has been dislocated to the outer side. This incident is associated with a great deal of pain. She takes the patella in her hands and pushes it back into place. This also is somewhat painful. She can then get up and go about, but the joint is painful for some days, and sometimes it becomes swollen, evidently a certain amount of traumatic synovitis resulting from the trauma. The right knee cap becomes displaced more readily than the left. She has not had a dislocation in the left knee for a year but she has had three or four dislocations in the right knee during that time. As long as she wears firm bandages on the knees, which she does, the displacement is not as apt to occur but it does occur in spite of the bandages. The trouble keeps her on constant nervous tension. Whenever she is walking or moving about

little as possible the blood-supply of the intestine in the enucleation of the tumor

A fourth point is the importance of controlling all bleeding and the necessity of drainage on account of the dead space that is left. We have all reached the point where we use drainage after abdominal operations as little as possible, and yet in cases of this kind drainage, although it has disadvantages, is, to my mind, very essential and very desirable.

After-history.—The patient made a very excellent recovery complicated for the first forty-eight hours with a tendency to dilatation of the stomach, which was overcome fortunately by lavage and washing out of the stomach. That with stimulating enemata secured early peristalsis. At the end of forty-eight hours the abdomen was no longer distended and he was then able to take fluids. At the end of the third day we began to very gently remove the iodoform strips. The cigarette drains were removed on the fourth day. The iodoform strips were out entirely on the fifth and the patient went on to a complete and very satisfactory recovery. The microscopic sections showed the tumor to be a fibroma.

Five weeks after operation the patient reports that he is back at his usual work and entirely free from all of his former distress. His bowels are moving normally without laxatives. Fluoroscopic examination at this time shows the stomach, small intestine, and colon in normal position. The small intestine has descended to the site formerly occupied by the tumor and the transverse colon is just above the level of the umbilicus (see Fig. 304 *B*).

rests is raised up on the outer side so as to prevent displacement. Other operations have been those of building up a ridge of bone on the femur external to the patella. This has been accomplished by some men by driving some heavy pegs in that position. Lorenz, of Vienna in particular published about the time of the beginning of the war—I think in 1914—reviews of the subject, and comes to the conclusion that extensive bone operations are not warranted. He advocates a simpler method and one that I shall adopt this morning that is, shortening of the muscles and ligaments on the inner side of the patella by dividing them and imbricating them so as to keep the patella well to the inner side and prevent in this way displacement. Lorenz believes that this will usually produce a cure. In extreme cases, however where it will not produce a cure he advocates removal of the patella and the filling of the defect with fascia lata.

On analyzing all the evidence in this case I have come to the conclusion to do the more conservative operation advocated by Lorenz. There is little tendency to knock knee and I do not think any bone operation will be required in her case.

She has been put to sleep under ether I have asked my assistants to pay extreme attention to the asepsis in this case, and in addition to the usual preparation with tincture of green soap shaving, alcohol and bichlorid, I have added the precaution of painting the field with two coats of tincture of iodin. I shall attempt to do the operation in such a way as to not allow anything to touch the wound except the sterile instruments and not allow even my own gloved fingers or those of my assistants to come in contact with the tissues.

I want to demonstrate to you how easy it is for me to produce this outward dislocation of the patella when the woman is relaxed under the anesthetic. With very little effort I now slide the patella outward and produce this outward dislocation and you see it remains in that position (Fig 306, 1) You will see, too that with very little effort I push it back into position. I do not believe that I have traumatized the joint much if any in this manipulation. When the patient has the dislocation when she is awake from some slight twist of the limb evidently the

she is fearful of a recurrence of the displacement. She has consulted a number of physicians, and finally has been referred to my clinic.

I have had some very excellent x ray pictures taken, and these show in the right knee a thickened and irregular mass of bone on the under surface of the patella, and also what seems to be isolated masses of bone in the posterior portion of the knee-joint just above and behind the tibia. The left knee, the better knee, shows quite a normal patella and a single isolated mass of bone in the posterior portion of the joint. I have inquired very carefully as to whether she has had symptoms that might be produced by a loose body in the joint, but accurate questioning fails to elicit any such symptoms.

Dr John B Murphy in the Murphy Clinics (Vol. III No. 4 p. 839) gave a very good description of this condition and the technic of the operation which he did in similar cases, and again in another clinic (Vol. V No. 1 p. 135) he described another operation for outward dislocation of the patella in a case in which he found, in addition to the dislocation a loose body in the knee joint.

After seeing this patient and looking over the literature of the subject with a good deal of interest and care I find that there has been a lot of work done and a great number of different operations devised for curing this condition. Some of these operations are very radical. In cases of outward dislocation in patients with marked knock-knee, correction of the knock-knee is sometimes the best method of curing the condition. Another operation that has been done with success has been that of chiseling off the insertion of the ligamentum patellæ into the tibia and attaching it to the inner surface of the tibia instead of to the tubercle. This change in direction of the insertion of the quadriceps extensor often cures the condition. Another operation that has been described is that of dividing the femur an inch or two above the knee-joint rotating the lower fragment inward so that the smooth outer surface of the femur on which the patella

Parker Charles A. Congenital Dislocation of the Patella, Surgical Clinics of Chicago, Vol. 4, No. 2, April, 1920, p. 339

patella goes out with the muscles tense, and the conditions are such as to make the little accident quite painful, but with the muscles relaxed, as they are under general anæsthesia, I am quite confident that we produced little or no trauma by this manipulation. I shall now demonstrate to you the fact that if with my finger and thumb I pick up the tissues on the inner side of the patella and pinch them together I cannot produce the dislocation. You will see as I hold with my finger and thumb the tissues on the inner side of the patella tightly I am not able to produce the dislocation.

I now make a vertical incision about 5½ inches in length midway between the patella and the internal condyle (Fig 307 1) I divide the skin and superficial fascia and the deep fascia. I now come down to the vastus internus muscle (Fig 307 2) I divide the vastus internus muscle for a distance of about 3 inches and I now imbricate the tissues, overlapping them for a distance of about 1 inch, holding them in position with mattress sutures of catgut (Fig 307 3) You will notice that I am sliding the outer edge of the incision in the vastus externus under the inner portion of the muscle. In the Lorenz operation he advised opening the synovial membrane of the knee-joint. I cannot see any good to be accomplished by doing this, and shall therefore, not do it in this particular case You will notice, however that I have exposed the synovial membrane for a distance of at least 3 inches. I have made a very careful dissection. You will notice that the fibers of the vastus internus muscle run up at this point fairly transversely outward and slightly downward, so that when we imbricate the muscle for a distance of 1 inch, as we have done, we shorten the tissues on the inner side of the patella very materially Now that the imbrication is complete, I shall attempt to produce the dislocation. You will notice that I am unable to do this even when I exert a good deal of force (Fig. 306 2) I am satisfied, therefore, that if we secure good primary wound healing we shall secure an excellent result and obtain such shortening of the tissues at the inner side of the patella as will prevent any recurrence. Having imbricated the vastus internus, I now imbricate the fascia lata which I have

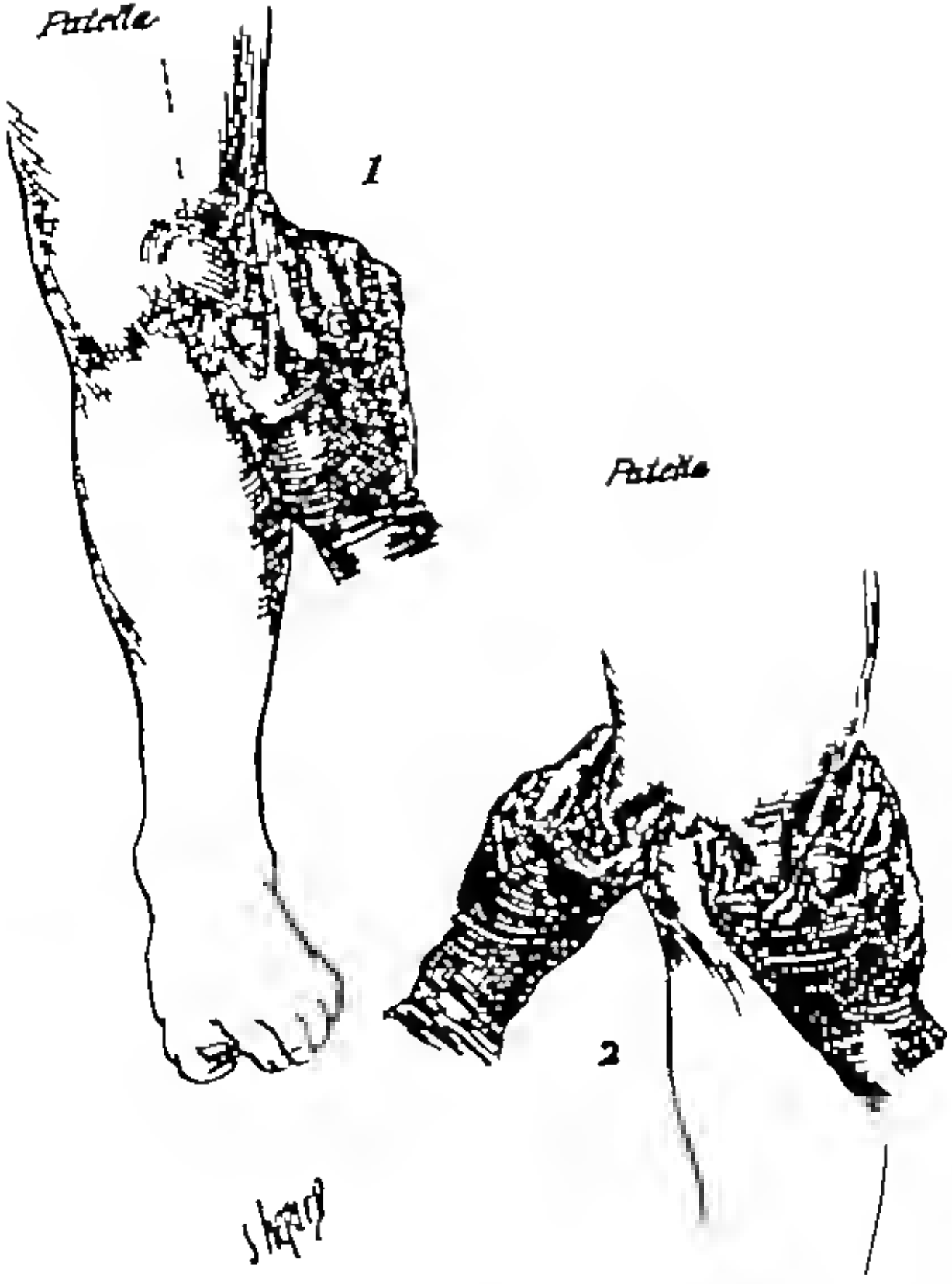

Fig 306.—1, Patella dislocated with slight pressure 2, Patella retained in normal position by shortening median musculature

divided, and then close the external incision with black silk (Fig 307 4)

I shall now prepare to do the operation on the other side. You will notice I make the same incision and expose in the same way the vastus internus after dividing the skin, superficial and deep fascia. I do not enter the synovial membrane. The *x*-ray pictures show that this knee is more extensively involved than the other and that there is on the inner surface of this patella an exostosis, probably the result of repeated traumas, and in the posterior portion there are two shadows which are consistent with being isolated pieces of bone, possibly even loose in the joint. My first thought has been to open up this joint and remove these foreign bodies, but I have come to the conclusion not to do this, inasmuch as I can obtain no evidence of any attacks that would seem to point to the patient's having suffered from loose bodies in the joint. I complete the operation on this side in the same way

I shall dress both of these limbs in copious sterile gauze dressing with a fair degree of tension, a soft-rubber roller over both knees, and put them in plaster of Paris. We will leave the stitches in until the eighth day and leave the casts on until we are sure that we have obtained complete wound healing I think in order to be on the safe side we will leave the casts on for fifteen to twenty days. After the operation I shall advise the patient to wear knee-caps for several months and be extremely careful not to put the joint through too wide a range of movement for some weeks.

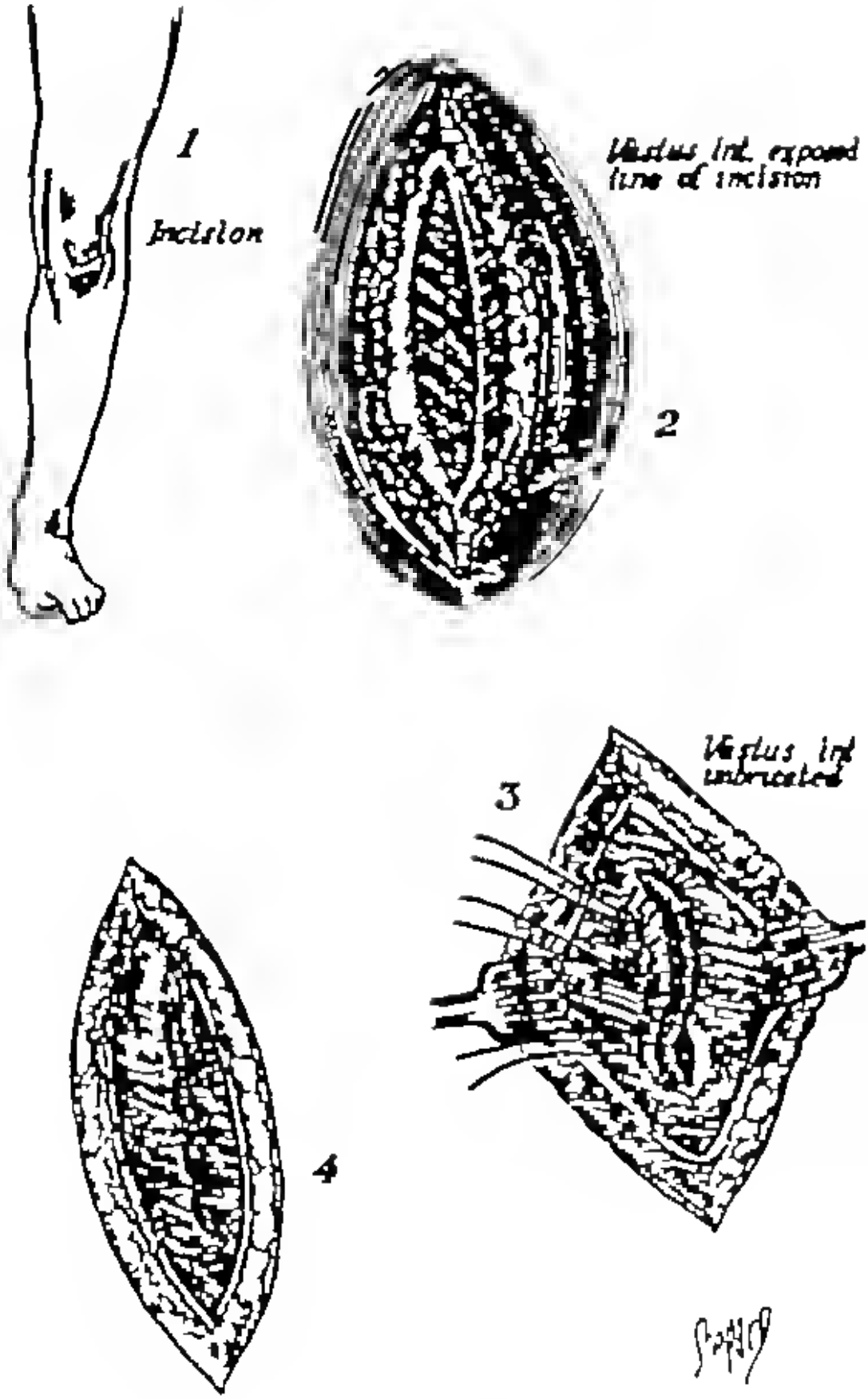

Fig. 307.—Technic of operation for relief of dislocation of patella.

CLINIC OF DR. GOLDER L. McWHORTER

PRESBYTERIAN HOSPITAL

SALPINGITIS WITH LATERAL LUMBOVERTEBRAL PAIN

Summary Presentation of three cases of salpingitis with lateral lumbovertebral pain as the most prominent symptom. Significance of this symptom in certain pelvic cases.

RECENTLY I have seen 3 patients with acute salpingitis in whom the predominating symptoms were in the upper abdomen in the region lateral to the lumbar vertebræ.

This patient, Mrs. G H., aged thirty five, was referred to me by Dr Hardt. She complained of a recent pain in the right side of the abdomen in the region of or just below the gallbladder of gas in the abdomen, belching flatus, and metrorrhagia.

The metrorrhagia had been fairly constant following an induced miscarriage three months ago The bleeding may have stopped for a day or two but it would always start up with any exertion. The patient had been doing her own work until four days ago. There were no changes at menstrual periods, as she had been bleeding almost continuously She denied having had anything like this before. Her miscarriage, she stated occurred only ten days past her regular period. She had no pain at the time.

The present chief complaint—the pain in the right hypochondrium—appeared four nights ago. It developed rather suddenly and soon became so severe that it bent her over when she tried to walk. The whole right side soon became tender and painful. The pain was not so severe the second day and is now noticeable only when she breathes deeply There is no pain in the chest. She took a large dose of castor oil at the onset. There has been no distention of the abdomen.

parametrium. The left ovary was entirely involved and apparently this side was the first involved. The right ovary was only slightly involved.

Examination of the upper abdomen revealed negative kidneys and a slightly thickened gall-bladder The appendix was obliterated. The sigmoid was adherent to the ends of the tubes, and when freed from them, pus ran out of the tubes. I removed both tubes and the left ovary resecting the partially diseased right ovary Two cigarette tube drains were placed in the pelvis, one on each side, and the abdomen closed.

The patient had a rather stormy time for the first few days and then made an uneventful recovery Following the pelvic operation I removed some very severe hemorrhoids under local anesthesia. She has now entirely recovered and is ready to go home.

The second patient, G E. B aged twenty four complained of pain in the right lumbovertebral region and in the lower abdomen, especially on the left side. The trouble began rather suddenly about ten days ago with pain in the lower abdomen, cramps, and fever This lasted two or three days, when she improved, until two or three days ago.

She gave a history of an abortion two years ago at the end of the second or third month. There was some fever and reaction afterward.

On examination, there was tenderness on pressure in the right lumbovertebral region. There was tenderness over the adnexa, especially on the left side. The fever was 103° F White blood count was 18,000 Urinalysis was negative except for epithelial cells and leukocytes.

Vaginal examination showed a foul discharge. There was a mass on the left side the size of a lemon, with considerable induration of the broad ligament. There was no mass palpable on the right side but some tenderness was present.

I advised her to go to the hospital, which she did. The next morning, under gas anesthesia, I drained an early abscess on the left side through the vagina. She made an uneventful recovery Her temperature remained below 99° F after the

Belching and discomfort from gas have been present the last four days.

After careful questioning she gave a history of a slight attack of pain in the left lower quadrant of the abdomen three weeks ago. The attack lasted, off and on, for two days.

Menstruation started at thirteen years and has been regular until the last three months. She was married at eighteen and has had 7 children. She has had two or three previous miscarriages.

On entrance to the hospital physical examination showed a very poorly nourished woman, evidently in a serious condition, although she was able to walk. Her general examination, except for the abdomen and pelvis, was negative. There was no distention of the abdomen. The right side gave moderate resistance to palpation and was quite tender in the right hypochondrium. There was no tenderness over McBurney's point or along the course of the colon. The spleen and kidneys were not palpable. There was practically no tenderness over the lower abdomen, but definite rigidity and muscle spasm could be elicited over the uterine adnexa, perhaps more on the right side.

Examination of the pelvis showed the uterus soft. There was a swelling on the right side the size of a fist. There was marked resistance on the left side, but no definite mass could be outlined.

Blood examination showed 75 per cent. hemoglobin, 11,500 leukocytes, and 3,820,000 erythrocytes. Blood-pressure was 102 systolic and 70 diastolic. The urine was negative except for the presence of a few leukocytes. Her temperature varied from normal during the day to 99 4° and 101 F at either 4 or 5 P M.

The pelvic findings and history of metrorrhagia suggested an ectopic or considering the history of an attempted abortion, infected tubes. The pain in the left side, coming on three weeks ago, was very suggestive of a left-sided infection which had become bilateral.

Under ether anesthesia the abdomen was opened through a suprapubic midline incision. Examination revealed a pelvic peritonitis. There was a bilateral salpingitis and an edematous

always associated with the onset or recurrent attacks of pelvic inflammation.

While a pyelitis would explain the pain in the lumbovertebral region, the examination of the urine and course of the pain would not seem to indicate its presence. It is possible that this lumbo-

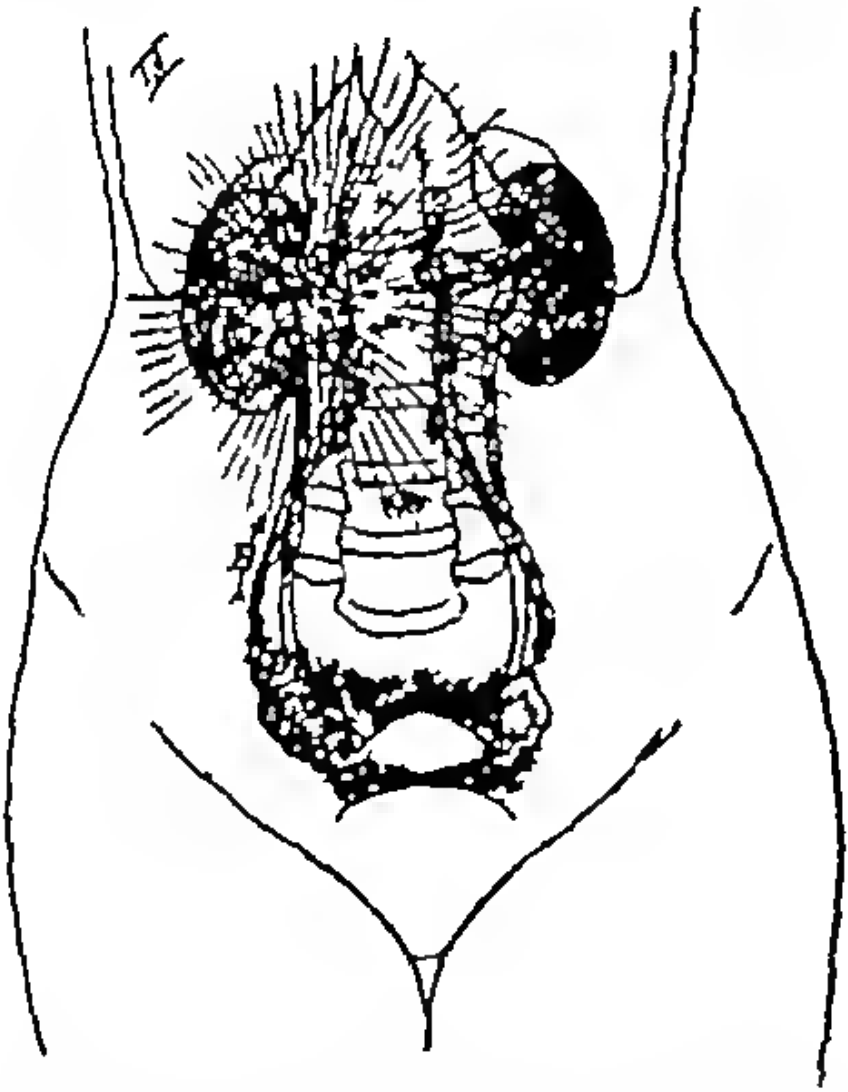

Fig. 308.—*A* Pyosalpinx. *B* Path of infection along lymphatics leading to lumbar glands (*C*). Radiating dotted lines represent pain.

vertebral pain is due to inflamed lumbar lymph-nodes. Just why these lymph-nodes are not always tender and give pain is hard to say. Perhaps it is partly due to the type of infection, as the streptococcus, and partly to the amount of parametrium involved. The parametrium was considerably involved in all 3 cases, with very marked edema in the first case.

second day She went home on the fifth day to convalesce. Ten days after the operation she complained of some pain in the left lumbovertebral region, but said she had no fever Following this she recovered without further complaints.

The third patient, M G., aged twenty-five, gave a history of an abortion about two weeks ago. A week later she developed pain in the right lower quadrant, which was referred somewhat to the back. She had some pain and soreness over the right lumbovertebral region, but the predominating pain was over the pelvis.

She was kept under observation for several days. Her fever varied from 99 4° to 101 F during the day Blood count showed 17,000 leukocytes, which did not increase. Three days after admission the pain in the right side quieted down somewhat, but there was increased rigidity over the left side of the pelvis. At this time there was also some pain and rigidity over the left lumbovertebral region. The fever was higher and there appeared to be definite masses on the sides of the pelvis. Operation proved these to be small bilateral abscesses, which were drained through the vagina.

DISCUSSION

In 2 of these 3 cases there was no difficulty in determining that the trouble was in the pelvis. The first patient had predominating pain in the lumbovertebral region, and a cholecystitis was strongly suspected until she had undergone thorough examination and observation.

In 2 of these cases, at least, undoubtedly the source of the infection was from an abortion In the third there was probably a neisserian infection.

Associated with the lumbovertebral pains there were muscle spasm and rather diffuse tenderness.

The urine examinations in these cases were made from the ordinary passed specimens. They were negative except for epithelial and white blood-cells, which are usually present with any discharge from the vagina. There were no persisting symptoms in the lumbovertebral region, and the greatest pain was

CLINIC OF DR. RICHARD J TIVNEN

MERCY HOSPITAL

CONGENITAL CATARACT BINOCULAR, COMPLICATED BY A LARGE PERSISTENT THYMUS GLAND

Summary Congenital cataract in child twenty months old presenting symptoms of cerebral palsy; physical and radiographic examinations reveal presence of large persistent thymus gland. Cataracts in children—varieties special discussion of lamellar cataract—tendency to progress—choice of surgical procedure—proper age to operate. Symptoms of thymus disease; treatment; effect of x-ray treatment in present case radiograms before and after x-ray treatment. Necessity of carefully examining as routine procedure for presence of enlarged thymus gland in the case of infants and the young upon whom surgical operation with general anesthetic is contemplated. Value of the radiogram in the diagnosis of persistent thymus.

THE ocular difficulty this little patient suffers is variously denominated *perinuclear zonular* or *lamellar cataract* This form of lens opacity is the most common type of cataract occurring in children. The illustration (Fig 309) shows from frontal and lateral views, the usual location and form of lens opacity This opacity is located, as a rule, in the layers of the lens between the cortex and nucleus partial opacities called "riders, so called because they ride upon, that is, are in contact anteriorly and posteriorly with the equator of the inner opacity also occur in the overlying layers the cortex and nucleus however are free from opacity When the pupil is dilated the cataract is seen with the ophthalmoscope to be a dark disk shaped opacity in the center of the lens, bounded or surrounded at its margins by a transparent red ring of clear lens (Fig 309) The center of the opaque disk is neither so dark nor so dense as its margins, and the "riders" are seen to radiate like spokes on a wheel, from the disk margins into the clear lens ring (Fig. 309) Oblique illumination discloses the opacity as a light gray disk

According to Piersol, the lumbar nodes are twenty to thirty in number and form three irregular rows along the aorta, extending from the level of the second lumbar vertebra to the bifurcation of the aorta and form the plexus lumbalis. The left lateral row is formed by a number of nodes in an almost vertical series upon the heads of the psoas muscle. The right lateral nodes occupy a corresponding position with relation to the right psoas, lying posterior to the inferior vena cava, but a varying number of nodes which may be referred to this group also occur upon the anterior surface of that vessel.

The lateral rows receive afferents from the muscles of the posterior abdominal walls, from the iliac nodes, from the testes in the male, from the ovaries, the fallopian tubes and uterus in the female, and from the kidneys and suprarenal capsules.

This lumbovertebral symptom should receive recognition, as it may be confusing in certain cases where it is difficult to obtain a proper history or where the pelvic symptoms are somewhat in the background. A proper history, careful examination of the pelvis, and a recognition of this symptom of pain lateral to the upper lumbar vertebræ will aid in the correct diagnosis.

entire lens. According to Spicer if the nucleus is small, with well-defined borders and the lens periphery perfectly clear no development of the opacity is to be apprehended. Critchett believes that if small linear opacities radiate from the nucleus edges to the periphery the opacity probably would progress.

Etiologically lamellar cataract, as a rule, is congenital sometimes it develops in early childhood. The patient almost always presents singly or in combination a history of convulsions or tetany rachitic evidences in the teeth, skull and long bones, and not uncommonly is below par mentally and physically Von Arx, quoted by Knapp found in 189 patients with zonular cataract convulsions in 57 per cent. rachitic changes in the teeth in 66 per cent., deformities of the skull in 32 per cent. changes in the bones of the extremities in 21 per cent. Horner believed that lamellar cataract was the result of rickets the latter being a disorder of nutrition, affects not only the bones but also the teeth and lens, which are embryologically similar His theory was that during the normal process of lens development the rachitis affecting the nutrition interfered with certain layers of lens structure, causing them to become opaque this cause being corrected, new transparent lens formed and enclosed the opaque zone. Heese and Phelps in a study of 43 cases of zonular cataract found distinct symptoms of tetany in 81 per cent. and they believe that zonular cataract is due to tetany

Syphilis may be a factor in its production, as also heredity and intra-uterine inflammation. Nettleship is of the opinion that when lamellar cataract is hereditary the small size of the lenticular opacity and absence of dental deformity indicate its development during the intra-uterine period. Knapp states that in inherited cataract the mother transmits the tendency to cataract to both sexes equally according to Groenouw the father transmits the tendency exclusively to one or more sons, sometimes to grandchildren, rarely to a female child.

Horner in assigning rickets as a cause of perinuclear cataract, emphasizes the changes in the teeth which many of these cases present. Practically all the cases exhibit "strumous

surrounded by a margin of clear lens. From a visual standpoint the density of the opacity is of more importance than its actual extent or diameter. The pupillary area is practically always entirely occupied by the opacity while the transparent portion of the lens is practically always covered by the iris. In many cases vision is so little impaired that the cataract is not discovered until later years, usually in the early years of

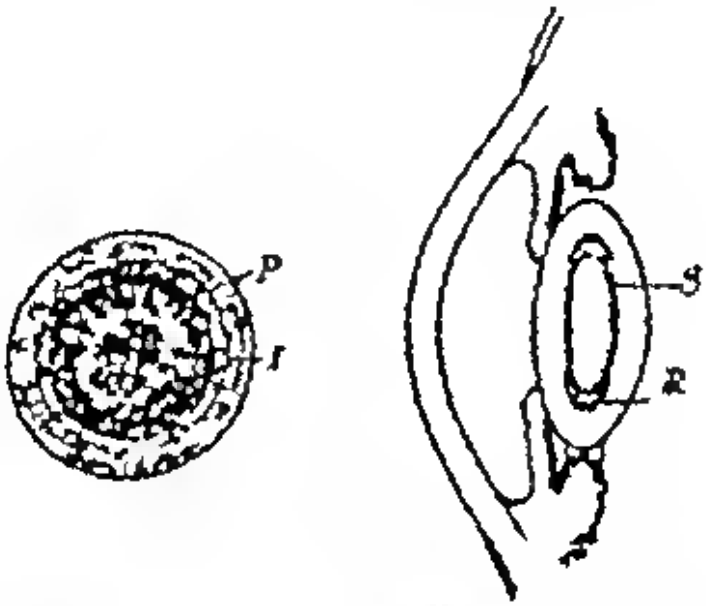

Fig. 209.—Lamellar cataract seen by reflected light. (Magnified 2 : 2.) The iris (*I*) has retracted under atropin. The opacity forming the lamellar cataract is denser at the margin than at the center. The riders are depicted in the upper half, but are left out below to show how a lamellar cataract looks with them. Between the margin of the opacity and the margin of the pupil (*P*) is a black interspace corresponding to the transparent periphery of the lens.

Diagram on the right. Lamellar cataract in cross-section. Schematic (magnified 2 : 1). The layers (*S*) placed between nucleus and cortex are opaque, but the adjacent layer is so only in the equatorial region (*R*), so that riders are formed. (After Fuchs.)

school life. The patients are often presumed to be myopic because they hold small objects close to the eyes in order to obtain a large retinal image. Fuchs believes this practice produces an elongation of the eyeball which results in a real myopia, while Fox holds that the development of lens and globe being interrupted, a small eye and consequent hyperopia result. Both eyes are almost invariably affected and the opacity only rarely increases; occasionally the opacity may develop and involve the

discission, is with advantage removed through a corneal opening by suction or irrigation, diminishing the tendency to complications arising chiefly glaucoma, and hastening the reparative process and termination of case. One eye is operated upon at a time and the discission must be repeated at suitable intervals until the lens is absorbed. Proper glasses are then ordered to replace the lens. Considerable diversity of opinion may arise as to the age when operative interference in the young is advisable. When the opacity is relatively extensive and dense no difference of opinion exists as to instituting an early operation. If the opacity be relatively small in extent, occupying but a small portion of the pupillary area, early operative measures may be postponed.

Fuchs believes that "cataracts which are congenital or develop in childhood should be operated on as early as possible, at the age of a few weeks. If the cataract is not operated on the development of the retina is arrested and amblyopia ex anopsia is produced.

My own experience strongly supports this view and I advocate as early an operation as the child's general physical condition will permit. Early operation removes the optical obstruction which prevents retinal functioning at a period in the child's life when developmental changes are most intense, and avoids the danger of retinal degeneration and consequent permanent impairment, if not, indeed, total loss of visual function. The restoration of visual function which early operation confers is also, I feel quite sure, an important element in the physical and mental progress of the child at a period in its development when even slight disturbances often exercise a deterrent or harmful influence.

The history of our little patient is as follows He is twenty months old Dr George C. Mosher of Kansas City the attending obstetrician, has kindly supplied me with the following notes of the baby and the obstetric history

The mother a primipara, was first seen about the third month of pregnancy At that time she was worried about her pulse, which varied from 50 to 60 per minute. Blood-pressure

teeth." The characteristic changes (Fig 310) consist in small horizontal furrows in the enamel around the tooth crown, especially upon the incisors. In the more advanced cases the enamel is absent and the surface is covered with yellow tartar

Treatment.—The treatment appropriate for perinuclear cataract varies depending upon certain definite factors. Improvement in vision, with the least hazard and distress, immediate and remote, to the eye is the objective desired. In certain cases where vision is satisfactory the ordering of suitable lenses may be all that is required. Usually however vision is not satisfactory and some improvement is necessary Two operative

Fig. 310.—Teeth with hypoplasia of the enamel from man with lamellar cataract. The teeth are yellow with rough surface. In most of these two furrows, separated by protuberances, run around the crown. The protuberance represents an enamel of normal thickness, while in the course of the furrow the enamel is very thin. So, too, the little pits which are to be seen most distinctly on the right upper canine teeth indicate spots where the enamel is thinned. (After Fuchs.)

procedures are available—iridectomy and discission or extraction of the lens. Iridectomy is indicated where there is ample transparent lens available and vision is markedly improved by dilatation of pupil. Where vision is not markedly improved by dilatation of pupil, the proper procedure in young people is discission of the lens in patients of advanced years, lens extraction. In the vast majority of cases discission is the most satisfactory This procedure requires prolonged period for its completion, but is unquestionably the safest measure available and may be done, as a general rule, on patients up to at least the age of twenty five Frequently the lens material freed by

or irritated marked convergent strabismus apparently alternating fixation cornea and sclera negative tension difficult to obtain by palpation, apparently negative anterior chamber negative irides negative—no posterior synechiæ present pupils equal contracted and slightly eccentrically displaced to nasal side pupillary reactions to direct light present, but sluggish lens of

Fig 311 —Radiogram of large persistent thymus gland before x-ray treatment The shadow extends in its horizontal axis approximately ½ inch to the left and ½ inch to the right of the sternal line. Vertically it approximates 2½ inches. (Compare with Fig 311)

each eye disclosed a dense lamellar cataract occupying practically the entire pupillary area fundus examination impossible the response to light perception test of each eye in all meridians seemed confirmatory but it was exceedingly difficult after repeated and patient efforts to be certain of this finding

The ocular findings indicated with reasonable certainty that visual function might be improved by removal of the cataracts.

was 115 systolic and 90 diastolic. There was no history of venereal disease, tuberculosis, or kidney trouble. She had had no miscarriages. Before marriage the husband had a Wassermann reaction, which was negative.

Urinalyses made at frequent intervals during the following six months were negative blood-pressure varied between 110 and 125 Six days before labor urine showed slight albumin, many white blood-cells, casts frequent, sugar negative blood-pressure, 150 Two days later on account of rising blood-pressure and slight general edema patient was taken to hospital and, under ether labor induced (von Voorhees bag) lasted almost forty-eight hours and terminated by low forceps baby delivered with cord once about neck blue baby resuscitation of baby required two minutes.

Weight of baby at birth was 6 pounds, 8 ounces, length 50 cm. Its general condition for forty-eight hours following birth normal. Early on the third day the nurse found it in a cyanotic condition, with irregular respiration—Cheyne Stokes in character—and pulse rapid, but regular Examination during this attack disclosed both anterior fontanel and the wide median suture bulging, without pulsation right eyelid edematous, completely closing eye left eye negative crying did not increase the bulging fontanel or its hardness knee-jerks normal, no contractures or spasms present. For three days following baby had almost daily attacks of this character after which its respiratory and cardiac system gave no further trouble. Both eyes exhibited congenital cataracts. About two weeks later Dr Curdy of Kansas City examined eyes, confirmed the diagnosis of binocular congenital cataracts, and recommended deferring operative procedure until baby was one or more years of age.

I first examined this little patient three months ago It is exceedingly difficult in infants to conduct a thorough and satisfactory ocular examination owing to the great irritability and lack of co-operation. At this examination I found the lids of each eye were negative globes normal in size, position and motility· orbits negative nystagmus, lateral and rotatory affecting both eyes, more pronounced when patient was disturbed

approximately ¾ inch to the left and ¾ inch to the right of the sternal line vertically it approximates 2½ inches. Radiogram diagnosis Large persistent thymus gland.

In order to decrease the size of the thymus gland *x*-ray treatments were given under my direction at weekly intervals for a period of twelve weeks. A radiogram (Fig 312) taken after the last treatment, showed that the enlarged thymus gland shadow had completely disappeared. The roentgenotherapy technic employed in this case was as follows

Broad focus Coolidge tube.	
Milliamperes	5
Spark gap	9 inches
Filter—aluminum	2 millimeters
Distance from skin to target	12 inches
Duration	2½ minutes
Application	1 each week
Number of treatments	12

After the *x*-ray treatments were begun I referred the patient to Dr Robert A. Black, pediatrician, for general physical examination. The following are his notes of the case

At Dr Tivnen s suggestion I have made several examinations of the patient during the course of the *x*-ray treatments. My first examination made a few days after the first *x* ray treatment presented the following findings

Previous History—Baby very blue when born first twenty four hours normal, then began to have frequent cyanosed spells, accompanied by rapid, irregular respiration which continue at irregular intervals to present time. The baby never becomes unconscious during these spells, which last from three to five minutes, and are often only a transitory flush twelve to fifteen attacks may occur in twenty four hours slight noise, undue excitement, hunger or fatigue are the usual inciting factors precipitating attacks. At one year of age patient had a severe pneumonia lasting a month a month later gastric attack, resembling intestinal influenza, lasting two weeks history of convulsions or tetany negative.

Examination—Child well nourished weight 26 pounds at

I therefore advised discision of lens at once if no contraindications were disclosed by a general physical examination of the patient. Preparatory to the operation I had, as is my routine custom when contemplating any operative procedure in the young either with local or general anesthesia, a radiogram taken of the chest to ascertain the condition of the thymus gland, a Wassermann test made on the blood and a general physical

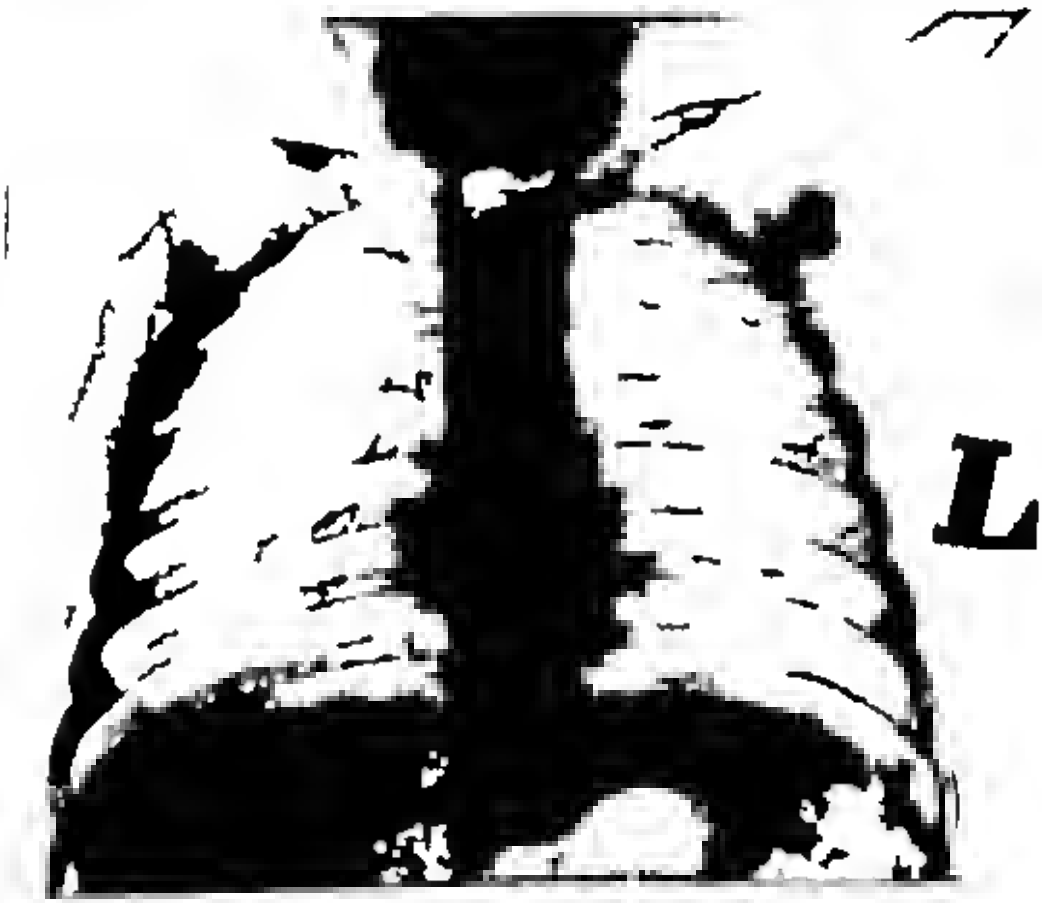

Fig 312.—Radiogram of same case after x-ray treatment. Note that the shadow of the enlarged thymus gland has completely disappeared (Compare with Fig 311)

examination of the patient. The Wassermann reaction was negative. The radiogram was positive disclosing a very large persistent thymus gland. The roentgenologist' report by John B Zingrone is as follows

"The radiogram of the chest shows a well-defined shadow in the area corresponding to that occupied by an enlarged thymus gland (Fig. 311) The shadow extends in its horizontal axis

anesthetic, general or local. The following notes on the subject of thymus gland disease are condensed from Dr Sajous excellent article on the subject in Sajous' Analytic Cyclopedia of Practical Medicine, Vol. VIII The thymus gland is made up of two lobes, situated partly in the superior mediastinum partly in the neck, in the middle line, and extending from the fourth costal cartilage upward to the lower border of the thyroid. It attains its full size at the end of the second year when its growth ceases and it gradually diminishes in size, until puberty when it has practically disappeared. In front it is covered by the sternum, below it rests upon the pericardium, the thoracic fascia separating it from the arch of aorta and great vessels in the neck it lies on the front and sides of the trachea It is about 2 inches in length, 1½ inches in breadth in lower portion and about 3 or 4 lines in thickness at birth it weighs about ½ ounce. The function of the gland is not definitely understood. Sajous believes that "it supplies through the agency of its lymphocytes an excess of phosphorus in organic combination (nucleins) which the body particularly the osseous, nervous, and genital systems, requires during its development and growth, ; ; during infancy childhood and adolescence, or later if need be. Enlargement of the thymus gland is commonly spoken of as status lymphaticus," but Sajous suggests that since practically all the symptoms both in adults and children are due to the enlargement of the gland itself the better term would be status thymicolymphaticus. The outstanding symptom of enlargement of the gland is *difficult respiration* chiefly affecting inspiration. This respiratory difficulty has usually three phases—*thymic stridor thymic asthma* and *thymic death*. Thymic stridor is often congenital or exhibited shortly after birth. It resembles croup and is aggravated by crying or screaming It is usually accompanied by a wheezing, which may be relieved by lying on the side or sitting up and leaning forward, and may be precipitated by feeding Acute infections, especially diphtheria, pertussis, and bronchopneumonia, are often the inciting factor of thymic stridor Thymic asthma may result progressively from the thymic stridor or occur inde-

twenty months 35 inches tall head circumference 16 inches eight teeth, all normal hair rather sparse and fine has many facial grimaces and is in a continual state of activity noisy toys only ones that interest him fond of music, has much rhythm when excited has coarse trembling spells without loss of consciousness knows all members of family by voice and touch he has been trained sufficiently to indicate when a bowel movement is wanted, also occasionally the urine is playful, affectionate, and not particularly rough in playing seems to understand a great many sentences and on repetition can be made to do little tricks seems to forget readily—a trick learned is forgotten rather quickly taste present has vocabulary of about twenty words and apparently uses them with understanding is rather spastic on handling is decidedly ticklish hands and feet are always sweaty perspires very easily no evidences of dietetic tetany in walking, which has occurred during the past two weeks, drags the right foot a little—right foot is also flat is right-handed, genitalia small umbilical hernia present, Babinski reflex negative all reflexes excessively active—the lower more so than upper heart, lungs, and abdomen negative large, well-defined, persistent thymus gland is present, which is easily demonstrable on percussion and corroborated by x-ray findings.

"Marked improvement has followed the x-ray treatment. The thymus has been reduced and since its reduction the patient has learned to recognize taste, his vocabulary has increased from one word, da-da, to about twenty intelligible words locomotion, which was absent, has been established the 'cyanotic spells have been reduced, a week having elapsed since the last one, and the trembling spells have been reduced in frequency Mental status seems to be about such as one would expect in a child of twelve months.

Diagnosis—Large persistent thymus gland cerebral palsy due to defective glandular secretion probability of cerebral hemorrhage at birth."

I feel quite sure a brief discussion of the thymus gland will be of value in the consideration of this case, especially in its bearing on the surgical aspect and the administration of an

resulting from the degeneration of the gland into a mass of adipose tissue, may be evident, such as deficient development of the osseous system bad teeth, etc. suggestive of rickets, mental intolerance, backwardness, a low relative lymphocyte count, sometimes due to the close relationship functionally of the thymus and thyroid insufficiency of the thyroid with symptoms of hypothyroidism may be presented. Eczema is frequent, as is

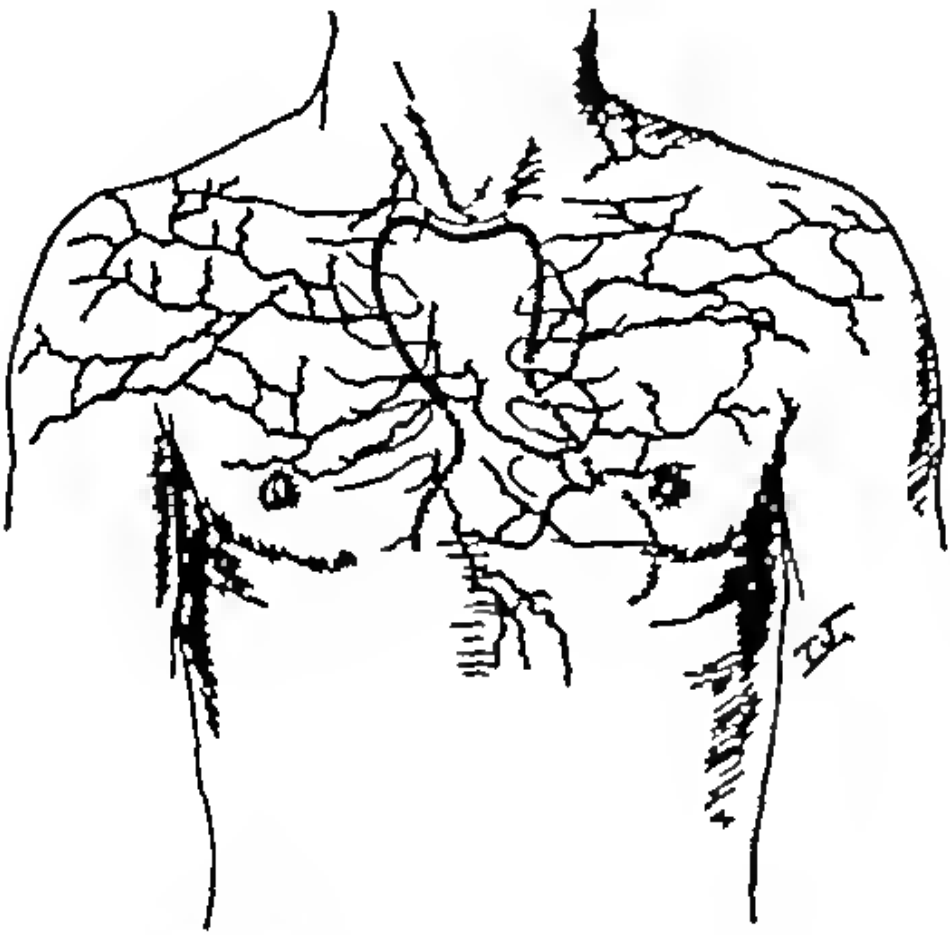

Fig. 311.—Venous engorgement due to enlargement of the thymus. (After Sajous.)

also deficient hair growth and infantile development of the genitalia.

Lymphatic Symptoms.—The superficial lymph-glands, notably those of the neck and axilla are more or less enlarged. In some cases but two or three lymph-nodes may be hyperplasic, while in others postmortem discloses practically all involved, bronchial, intestinal, mesenteric, and in particular the retro-

pendently It resembles violent attacks of asthma, with inspiratory stridor cyanosis, pallor inspiratory laryngeal stenosis, and sometimes spasm of glottis. Thymic death applies to cases in which death occurs suddenly without previous history of thymic asthma, postmortem disclosing an enlargement of thymus sufficient to compress the trachea, recurrent laryngeal and vagus nerves, the great vessels of the upper thorax and lower cervical region, and the right auricle. It may occur in adults and children after intense emotional excitement, anger fright, anesthesia, slight operations, extraction of teeth, etc., and during coitus, dancing swimming, etc. The majority of cases of thymic death occurs in children who are found dead in bed, the cause of death being an enlarged thymus, resulting in asphyxia, tracheal stenosis, laryngeal spasm or cardiac paralysis. Certain symptoms may in the majority of instances, indicate a predisposition to the disease. These may involve principally the gland itself, producing *thymic symptoms* or principally the lymphatics, producing *lymphatic symptoms*.

Thymic Symptoms.—Among the thymic symptoms enlargement of the gland itself is the outstanding one. This enlargement may be demonstrated by gentle percussion of the area of dulness. Figure 313 shows this area in a solid black line as an irregular triangle or heart shaped, with its base covering the sternoclavicular articulation and its apex somewhere about the third rib over the base of heart. The broken line indicates the heart outline. The dulness extends on either side of the sternum more so to the left. If in this location, dulness extends ½ inch or more beyond the sternal line on each side, enlargement of the thymus is probable If it also extends across the sternum to the right a greatly enlarged thymus is probable. Bulging of the upper part of sternum and enlarged veins over the chest (Fig 313) may be present. The x-ray may corroborate the areas of dulness, a shadow being present on the left of sternum, sometimes extending downward as far as the ensiform cartilage and over the pericardium. Auscultation may disclose a friction sound caused by the air coming in contact with the edge of the impinged trachea. Other symptoms due to thymic insufficiency

thing likely to increase the blood-pressure, such as excitement, crying etc. cold or hot baths, sea-bathing· selection of favorable position in sleeping preferably a sitting up or lying on the side guarding against acute infections which cause hyperemia of the gland avoiding constipation and producing a régime of an out door life in a mild climate, where catarrhal disorders are not prevalent.

The foregoing is a summary of the outstanding features of thymus gland enlargement. It is probable that persistent thymus gland enlargement of great or less extent is more common than is generally assumed. In many cases it appears likely the enlargement in the course of the child's development may shrink without disturbance to the patient or indeed, without its presence being suspected. The important fact, however to keep in mind is, it seems to me, that aside from the influence the enlargement may otherwise exert, *such patients as surgical risks are undeniably distinct hazards* and ordinary prudence suggests that the only safe course to pursue when an operative procedure is contemplated particularly in infants and the young, especially when they present lesions attributable to some vagary of evolutionary character *is to definitely determine the condition of the thymus gland before the operation is undertaken.* I have personally encountered 3 cases of this character in which a radiogram taken before operation disclosed a large persistent thymus gland. Profiting by these experiences, I have adopted and advocated for some time past as a routine procedure in young subjects the taking of a radiogram of the thymus to determine its condition before undertaking any operative procedure, major or minor either under local or general anesthesia. In my own experience, physical examination alone of the chest is neither satisfactory nor conclusive, and I have come to regard the radiogram as the most reliable and dependable method when properly taken by an experienced roentgenologist. In one of my cases physical examination of the chest by an experienced and skilful diagnostician proved negative, while the radiogram showed a large persistent thymus gland. Another case, coming under my observation, which strengthened my resolve to

peritoneal. The tonsils—lingual, faucial, and pharyngeal—are usually enlarged. The spleen is sufficiently enlarged in some cases to become palpable.

The foregoing thymic and lymphatic symptoms constitute the main symptoms of this disease, and when any of these symptoms are found in a child or adolescent who is subject to attacks of dyspnea on exertion or of laryngismus stridulus, the patient is to be regarded as in danger of thymic dyspnea, which may unexpectedly develop a fatal asphyxia. The cause of the stridor and the fatal asphyxia in this disease is variously ascribed as due to pressure of the thymus, to toxemia, and to acid intoxication.

Treatment.—The *x*-ray is the one effective agent, but it must be used with discrimination. In cases where an enlarged thymus has been rendered deficient through focal degenerative changes, with secondary cretinism myxedema, or Addison's disease, it will do more harm than good. Where these symptoms are absent and there is a relative lymphocytosis or even leukocytosis the *x*-ray may prove effective and even curative.

Complete thymectomy is inadvisable in young children owing to the danger of interfering with their development, skeletal, mental, and sexual after puberty these dangers from the operation are lessened. Partial subcapsular thymectomy ligation of some of the thymic arteries, exothymopexy (raising of the organ and stitching it to the sternum) are available for children and are usually effective. Deep intubation, the tube reaching below the obstruction, tracheotomy with oxygen inhalations, cold compresses over the thymus, and the upright position are all useful to relieve the attacks of dyspnea. Thyroid gland extract and iodin, the former if myxedematous symptoms are present, the latter when there is a history of syphilis, may prove serviceable. In rachitic cases calcium lactate with thyroid gland in small doses, also thymus gland, is beneficial. *It is to be emphasized that anesthetic and operations readily induce death.*

The prevention of paroxysms in such cases involves the regulation of feeding Copious feeding tends to thymus enlargement, and such patients should be on a low diet, avoiding any-

ENDOTHELIOMA OF ORBIT: TOTAL SYMBLEPHARON; RESTORATION OF CULDESACS; TRANSPLANTED FLAP (WOLFE)

Summary Total symblepharon with obliteration of the culdesacs following injury to eye in infancy Restoration of culdesacs by Wolfe graft, permitting use of artificial eye. Trauma from damaged edges of "shell eye responsible for development of an endothelioma of the orbit eleven years after operation. Removal of tumor and restoration of culdesacs. Technic of operation.

THIS patient at the age of fourteen months suffered an extensive trauma of right eye from a blow with a walking stick, resulting in loss of the globe, which was enucleated, and severe injury to both lids, terminating in total symblepharon with obliteration of the culdesacs which prevented the wearing of an artificial eye. Twenty two years later she first consulted me, desiring that an attempt be made to permit the wearing of a suitable prosthesis.

Examination —This disclosed that the orbital contents were shrunken and contracted and total symblepharon was presented, with complete obliteration of both culdesacs.

At that time I performed the usual operation for restoration of the culdesacs, freeing both lids, excavating a deep furrow for the culdesacs, and lining the new-made cavities with a Wolfe graft from the inner arm, held in position by an appropriately formed piece of block-tin. This operation was successful and the patient was able to wear a prosthesis with satisfaction and comfort for approximately eleven years. About three weeks ago she consulted me again, giving a history of inability to wear the prosthesis for the past six months. Examination of the orbit disclosed that practically the same condition obtained as when she first consulted me eleven years previously Total symblepharon of both lids was present, the culdesacs were obliterated and the orbital contents, bathed in mucopurulent secretion, were irritated swollen, and inflamed. In addition, a

continue my routine practice of always investigating in young subjects the condition of the thymus gland before administering an anesthetic, was that of an infant of two and a half years, upon whom in the course of several months I was expected to perform a tonsillectomy and adenectomy the parents one morning found the little one dead in its crib. It had suffered no previous illness of any character and was regarded as in excellent health. A postmortem was done and the findings disclosed a large persistent thymus gland with associated general adenopathy This case was no doubt one of thymic death, as described by Dr Sajous.

In our little patient this morning the clinical history fits perfectly the diagnosis of a large persistent thymus gland. The attacks of dyspnea, the spells of cyanosis, the delayed development, the mental status, the congenital cataracts—all are characteristic. In addition, the radiogram corroborates the clinical history and the reduction of the gland, as shown by the skiagraph, under x-ray treatment, is coincident with the improvement in the child's development and diminution in the severity and frequency of the attacks of dyspnea. It is my purpose to defer the discission of the lens in this case until the child attains and maintains the best physical condition possible. When this period is reached I shall have a radiogram taken, and if no evidence of the enlarged thymus be disclosed I shall undertake the discission of the lens.

the after-treatment call for discrimination and judgment as well as painstaking and faithful attention to detail. While similar general surgical principles underlie the successful carrying out of any of the methods employed, a wise choice of procedure applicable to the particular case is of paramount importance, and the happy selection of a method suitable to the individual case goes far in insuring success.

The object in view of all methods may be divided surgically into three steps (1) To free the lids from the tissues of the orbit, (2) to restore and enlarge the culdesacs, and (3) to line the culdesacs with epithelium to prevent a recurrence of the adhesions. In carrying out these steps I have in several cases employed the following procedure with satisfaction. The first step is usually accomplished without difficulty In performing the second step it is necessary to provide a generous sulcus to guard against the contraction which invariably follows. This contraction, in my own experience, is always greater at the inner and outer extremities of the culdesac, the canthi, than in the depth of the culdesac. To overcome this tendency to contraction in the depth, and particularly at the outer and inner extremity I endeavor to extend the depth of the culdesac to the margins of the orbit down to the periosteum, and I employ as large a plate of block tin as possible both in vertical and lateral dimensions including the external canthus, if necessary to permit of its easy introduction and comfortable retention, bearing in mind the possibility of pressure necrosis.

The third step, that of lining the new-made culdesacs with epithelium, is the most important as well as the most difficult. In choosing a suitable epithelial lining my own preference is for the Wolfe flap taken from the inner arm and freed from all subcutaneous tissue. It is remarkable how much shrinking takes place in these transplants. To overcome this shrinkage it is necessary to provide a flap at least three times as large as the actual measurements of the spaces to be covered indicate. To combat this shrinkage Dr Weeks advocates the fixing of the flap in extension, which he accomplishes by anchoring the flap to the periosteum or its overlying tissue by means of several

well-defined tumor the size of a large marble, occupied the lower cul-de-sac.

The patient stated that for the past six months she had been wearing a 'shell' eye, being unable to obtain another "reform" model, having broken the one which she had worn following the operation. Examination of this shell showed the margins were worn thin, serrated, and nicked, and the patient explained that frequently it had been at times painful to wear that some bleeding had usually followed its introduction, and that for the past month she had not been able to wear it at all.

Suspecting a possible malignancy a portion of the growth was excised and sent to the laboratory for microscopic examination. The following is the report on the examination of the specimen made by Professor F Robert Zeit "Tumor of orbit. Diagnosis Endothelioma. Surface epithelioma intact and it shows no atypical growth. Below this a neoplasm dense fibrous tissue stroma with atypical endothelial cell-nests. An endothelial neoplasm starting from the endothelial lining of lymph-spaces. These endotheliomata are of slow growth and although malignant, do not produce metastases for a long time, and are, therefore, often cured by thorough excision.

The condition of the orbit this patient now presents, as well as the development of the endothelioma in the lower cul-de-sac, is directly due to the trauma and irritation inflicted by the damaged edges of the "shell" eye she has been attempting to wear for the past six months. Under appropriate treatment the acute inflammatory reaction has subsided and the mucopurulent secretion has practically disappeared. The situation was explained to the patient and she elected to have the tumor removed and the cul-de-sacs restored, so that, if possible, a prosthesis might be worn.

The treatment of total symblepharon, with restoration of the cul-de-sacs, presents many difficulties. In order to obtain a satisfactory result several operations are frequently necessary and the patience and faith of both operator and patient are often taxed to the utmost before a final successful result is attained. The choice of method the technic employed and, in particular

double-armed sutures which pass through the flap the periosteum, the cheek or brow and are tied over small rolls of gauze. This method has the additional advantage of fixing the flap firmly to the apex or depth of the culdesac until the attachment is established. I can speak with favor of this suggestion, as I have found it of great service, especially when used in connection with the plate of block-tin. This plate is modeled to fit the enlarged culdesacs especial care being taken to see that its vertical dimension is sufficient to reach the depth or apex of the sulci, and its horizontal dimension sufficient to prevent shrinkage and displacement of the flap as well as to preserve a sufficient width of culdesac at each canthus.

After removing one flap from the arm all subcutaneous tissue is removed, the retaining silk sutures are introduced in the appropriate position, carried through the periosteum and cheek, and tied over the small gauze rolls. The remaining flap is treated in a similar manner and finally the block tin plate is inserted. It is essential before applying the flap that all hemorrhage in the culdesacs be checked, and the flaps themselves should be handled with great care to avoid trauma and consequent reduction in their vitality After concluding the operation the lids are lightly covered with a bichlorid ointment (1 5000) and a light dressing applied. The dressings are changed within forty-eight hours and the lids cleansed the retaining sutures are left in position about ten days.

In operating on this patient one week ago removing the endothelioma radically and restoring the culdesacs, I employed the foregoing technic, and today there is every evidence that our efforts will prove satisfactory

Figure 314 illustrates the condition she presented and the steps carried out in the operation.

Fig 314.—1, Appearance of the injured eye before operation—the inversion and retraction of both lids were marked. 2, Lateral view showing both lids adherent to the orbital contents. 3, 4, The epithelial flap in position retained in position by the plate of block-tin (5) The dotted lines represent the retaining silk sutures through flap, periosteum, cheek, and bone. 5a, The plate of block-tin. 4, Front view of eye after operation, with the three upper and lower retention sutures tied over small rolls of gauze.

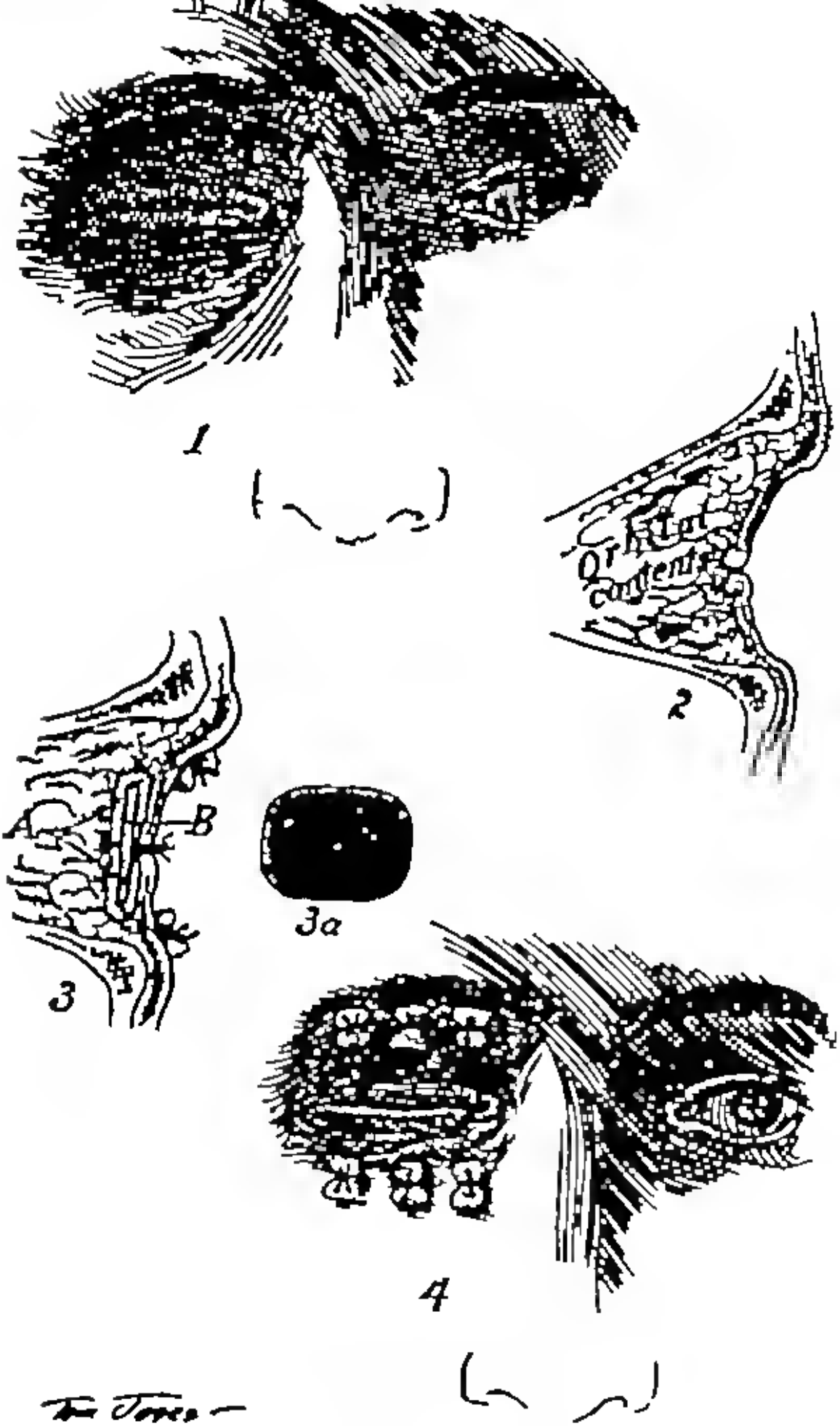

Fig. 314.

EXTRADURAL ABSCESS; OTITIS MEDIA PURULENTA CHRONICA; OPERATION; RECOVERY

Summary Patient presenting symptoms of brain abscess, the sequel of otitis media purulenta chronica of eleven years' duration. Neurologic findings by Dr Mix—significance of wild delirium presented by patient—diagnosis. Types of brain abscess following otitis media. General symptoms of brain and extradural abscess—prognosis; value of early recognition and prompt surgical measures. Operative treatment and result in present case.

The history of this patient is as follows

He is sixteen years of age and has always enjoyed good health. At the age of five he developed an otitis media purulenta of the left ear The origin of the otitis media is not clear there was perhaps an acute pharyngitis, tonsillitis, rhinitis, or something of that kind It was not of the diphtheric or influenzal type, and apparently was not streptococcic. The discharge did not clear up but continued in a subacute form with occasional exacerbations of pain up to the present time. Last Monday he developed a severe pain intermittent in character in the ear and first came under my care. Examination of the ear disclosed the drum membrane practically destroyed and a moderate purulent discharge present. His temperature was 99.2° F pulse 93 The mastoid was not tender and the patient's general condition at this time was comfortable, with no pain in the ear and did not suggest the serious involvement which later developed. I placed him on the usual treatment and directed him to report the following morning. During the night the patient discovered a package of aspirin tablets and took, it was estimated, approximately 120 grains. The following morning he was stuporous and rather irritable. I ordered him to the hospital at once. By afternoon the irritable condition had increased markedly and he became very delirious. No rigors were present. A spinal puncture was done. The recovered spinal fluid was very turbid and disclosed a very high count, 8950 cells per cubic millimeter

The patient on Monday night was perfectly rational. During the evening he took a large amount of aspirin, as Dr Tivnen has already stated. He was all right on the morning of Tuesday but by afternoon, when I examined him, he was in a state which might almost be called maniacal. He was an extremely hard patient to examine. His hyperalgesia was such that he resented being touched, and on one occasion he grabbed my thumb and bent it backward with all his power as though he did it consciously and viciously I am persuaded, however that he did not know what he was doing. Such a very sudden onset of delirium is usually associated with edema of the cortex. One finds it, for example, in the superficial veins of the pia-arachnoid. One finds it in the so-called "wet brain. This excessive delirium, constituting almost a mania, is not a part of the picture of an ordinary case of meningitis. In cerebrospinal fever the onset is usually with headache, vomiting and fever followed within a few hours time by hypertonus and hyperalgesia, these two generic signs indicating the specific irritation of the central nervous system. Delirium occurs usually fairly early and is also a sign of irritation of the membranes of the brain but no such delirium as was found in this case occurs in the ordinary patient suffering with meningitis. The main fact in this boy's disturbance was the presence of a delirium very sudden in onset and out of proportion to the rest of his symptoms. The fact that he had such a delirium together with the additional fact that he had a slight paralysis of the left external rectus would seem to indicate that his disturbance did not lie in the posterior fossa. One would rather be inclined in the presence of such delirium to suppose that the brain complication, resulting from the discharging ear lay in the middle rather than in the posterior fossa.

Another question which immediately presented itself was whether the abscess which we assumed must be present, inasmuch as there was so much evidence of cortical edema, was extra or intradural. The presence of 8950 cells per cubic millimeter might lead one to infer that the abscess had already broken intradurally On the other hand since the patient was not in a

Examination of the spinal fluid and of the purulent discharge from the ear showed the presence of pneumococci in both.

The left eye turned in, due to paralysis of the external rectus muscle. The pupillary direct light reflexes were sluggish. Examination of the eye-grounds was negative. A diagnosis was made of meningitis, with a probable temporosphenoidal brain abscess secondary to an extension of the middle-ear infection. The serious nature of the case was explained to the father and at my suggestion Drs. Andrews, Mix, and Kreuscher were called in consultation. These consultants agreed with the diagnosis and joined in my suggestion that an immediate operation be undertaken. I will ask Dr Mix to give you the neurologic findings and to elaborate on the significance of the symptomatology from a neurologic standpoint.

Dr. Charles Louis Mix The findings which Dr Tivnen states this patient presented, namely that he was stuporous and rather irritable, that the spinal puncture disclosed a turbid fluid with a very high cell count, 8950 cells per cubic millimeter and almost thick enough to deserve being called purulent, were present on Tuesday morning At that time he had no signs of meningeal disturbance, but by Tuesday afternoon there had developed a paresis of the left external rectus of the eye, so that th eye turned in. By the time I examined him he had also developed a well-defined Kernig sign on both sides. He also showed a considerable degree of rigidity in his neck and a great deal of rigidity in his back. There was also a marked rigidity of his abdominal muscles. These evidences of rigidity including the Kernig sign, are indicative of the presence of meningitis, in which disease there is hypertonus of the muscles everywhere.

In addition to the hypertonus there was also marked hyperalgesia everywhere he was touched he manifested displeasure, and evidently hated to be moved or disturbed in any way Examination of the secretion from the ear and examination of the cerebrospinal fluid showed the presence of pneumococci in both, which seemed to indicate a rather ominous outcome.

The most important element, however in his symptomatology I have not yet mentioned. This was an unusually wild delirium

lies the merging of the acute process into a chronic one. An arbitrary rule exists, however that when the discharge following an acute otitis media purulenta persists longer than eight weeks the condition is classed as a chronic process. The pathology of the chronic process is, of course, a more extensive and destructive invasion of the ear structures than occurs in the acute process. The explanation of an intracranial extension of a chronic suppurating ear is to be found in the close anatomic relation of the ear and mastoid to the cranial fossæ. Examination of these several structures discloses that only very thin bony partitions separate them and, in addition, the vascular and lymphatic relations are likewise free and intimate. The roof of the tympanum which separates it from the middle cranial fossa is exceedingly thin so too is the roof of the mastoid antrum and that of the mastoid itself The walls of the mastoid are in close contact with the lateral sinus, the facial nerve and the labyrinth. The communication between the mastoid and tympanum is direct and most easily accessible and the floor of the tympanum is in close contact with the carotid and jugular bulb In addition to these close anatomic relations—common to both adults and children—there are in the young additional routes of infection provided by the ununited sutures between the several portions of the developing temporal bone, as well as dehiscences, which occasionally occur These intimate relations permit the extension of an acute or chronic process to the related structures with comparative ease. As a result of such invasion the following complications may develop by an extension outward through the mastoid cortex a subperiosteal abscess located behind the auricle may be produced extension through the tegmen tympani into the middle cranial fossa may cause a cerebral abscess or meningitis extension backward into the cerebellar space or lateral sinus may produce a cerebellar abscess or lateral sinus thrombosis extension downward and backward into the digastric fossa, with escape of pus into the tissues of the neck may result in a Bezold's abscess extension downward through the floor of the tympanum may involve the carotid or jugular bulb extension inward through the inner wall

stuporous stage, but was in a state of excessive excitement, it was evident that he was still in a state of irritation, and it was likely that the abscess had not broken. Had the abscess broken we should expect the patient to be in a state of stupor. It seemed likely that the abscess started from the ear that it went through the tegmen tympani, that it had reached the interior of the middle fossa, and that it had produced an extradural abscess compressing the temporosphenoidal lobe. We had to assume the presence also of a meningitis because of the cerebrospinal fluid and the presence of pneumococci in it.

Immediately the question of treatment came up. It was evident that if anything were done it would have to be done immediately The wisest thing seemed to be to open into the middle fossa close to the petrous portion of the temporal bone with the hope of finding an abscess which could be drained. Operation was, therefore, decided upon by the consultants.

Dr. Tivnen: From an otologic standpoint we may summarize the pathologic evolution of this case as follows First, our patient in early childhood, at the age of five, contracted an acute otitis media purulenta, in all probability secondary to a pharyngitis or acute rhinitis. Second this infection cleared up only partially and the patient was left with a chronic otitis media purulenta. Third, as time went on a chronic process developed, an occasional acute exacerbation occurred the perforation in the drum membrane increased and the mucous membrane of the tympanum was infected polypoid degeneration ensued, the purulent discharge persisted, the ossicles were attacked and became necrotic, the hearing function was practically destroyed, and finally early Tuesday morning the suppurative process broke through the bony roof of the attic and invaded the region of the middle cranial fossa, resulting in an extradural abscess of the temporosphenoidal lobe with involvement of the surrounding meninges. The majority of cases of intracranial extensions secondary to middle-ear infections are due to the chronic type of ear suppurations. When does an acute middle-ear infection become a chronic one?

There is no hard-and-fast period of duration which character

The symptoms in general of brain abscess are those of localizing significance and those arising from the septic process itself. The localizing symptoms are dependent upon the location of the abscess. The symptoms arising from the abscess, irrespective of its location, vary greatly. Macewen divides the process from a symptomatic standpoint into three stages—the first stage being characterized by pain in ear extending later to temporal, frontal, and occipital regions, vomiting, rigors, slight elevation of temperature, accelerated pulse, prostration marked and lessened ear discharge; the second stage, by diminished pains, tenderness over and around mastoid to percussion, slow cerebration, mental obscuration, temperature normal or subnormal, pulse slow and full, optic neuritis frequently present; the third stage by stupor and coma, and, if abscess ruptures, by rigidity of limbs, clonic spasms, quick pulse, rapid respiration and high temperature.

Epidural abscess, in a broad sense, is, as Dench expresses it, an effort on the part of nature to confine a meningeal infection to a localized area and thus prevent general meningitis. Often no symptoms in this type of abscess are complained of by the patient other than a localized headache, with tenderness on percussion over the painful area; the ear and mastoid being relatively free from pain.

In a given case of middle-ear infection, either of the acute or chronic type, with suspected mastoid involvement, such a localized headache, in connection with slight rise in temperature, is to be considered suggestive of a possible extradural abscess.

The prognosis of brain abscess depends in great part upon the prompt recognition of the complication, the stage in which the surgical relief is instituted, the area and extent of the process, and the success in locating and evacuating the purulent collection. The percentage of recoveries varies, according to the stage operated, from 10 per cent. in the early stage to 90 per cent. in the late stage—the average percentage being approximately 50 per cent. Epidural abscess offers a more favorable prognosis than cerebral or cerebellar abscess.

In view of the fact that all our experience with the intracranial

may involve the facial nerve and labyrinth extension into the general system may produce metastatic infections of the lung, heart, liver spleen, kidneys, joints, etc.

It would appear from the close anatomic relation of these several structures that extension of the middle-ear infection to the cranial structures would occur commonly and frequently. Clinically however perforations of the mastoid cortex are much more frequently encountered than extension of the infection into the cranial cavity or to the lateral sinuses. The cause of the intracranial complication is the entrance of infectious products from the suppurating ear or mastoid focus, usually through a necrotic bone area coming in direct contact with dura or sinus. Occasionally, it occurs through a vascular or lymphatic channel.

As to the frequency of intracranial involvement from suppurative middle-ear process, it may be said that such involvement is very uncommon consequent upon acute suppurative middle-ear process, occurring in about 25 per cent. of such cases. The majority of such extensions are, as I have said, chargeable to *chronic* middle-ear suppurations. The particular type of intracranial involvement is subject to considerable variation. It may be a general meningitis, an epidural abscess, a sinus thrombosis, or a cerebral or cerebellar abscess. Hessler states that in 81,634 ear cases treated there were 116 deaths due to intracranial extension of these 48 died of sinus thrombosis, 28 of cerebral abscess, and 40 of meningitis. Of all intracranial complications consequent upon suppurative middle-ear disease, sinus phlebitis and sinus thrombosis are most frequent. It is generally admitted that a large percentage of brain abscesses are due to suppurative ear disease. Osler states that one-third to one-half of brain abscesses follow otitis media and that the vast majority of these are consequent upon a chronic type of infection. Temporal lobe abscess is about twice as frequent as cerebellar abscess. This is explained by the anatomic fact that the temporosphenoidal lobe rests upon the roof of the tympanum, only a thin plate of bone intervening. Abscesses of the fronto-occipital lobe are very much less common than those of the temporosphenoidal lobe.

The roof of the antrum and tegmen tympani was removed. In the region of the middle cranial fossa an abscess was encountered and about 2 drams of pus escaped under marked pressure. The dura was only slightly disturbed, pulsation was present, and there were no fluctuating areas. A nosophen gauze dressing was inserted, the wound filled with gauze, and a sterile dressing applied. His condition was so critical that I felt it unwise to carry out a radical mastoid operation at this time, and I deferred this procedure until a later and more favorable period.

Within thirty-six hours after operation the patient had recovered from the delirium and presented a normal mental condition. His subsequent progress was uneventful, and his improvement continued daily without untoward symptoms or complications arising. In the course of eight weeks he was dismissed from the hospital in excellent condition.

complications of middle-ear and mastoid infections emphasize the great value, as a life-conserving factor of *early and prompt operative interference*. It is incumbent upon us to maintain a vigilant attitude in such cases, to the end that the benefit of an early surgical measure may be instituted, when conditions indicate, without hesitation or unnecessary delay. Our present case is a striking example of this. It is certain that early recognition of the intracranial complication from which he suffered, coupled with the prompt institution of the proper surgical procedure, saved his life. A delay of many hours would undoubtedly have entailed most serious consequences.

In conducting our operative procedure we have the choice of two routes of entering the cranial cavity in cases of brain abscess complicating middle-ear suppuration. In such cases it is reasonable to assume, unless localizing data suggests otherwise, that the cerebral involvement is located in and about the area most commonly the site of such an abscess, namely the temporosphenoidal lobe in the middle cranial fossa. The two routes are through the skull surface and through the mastoid. The latter route is preferable, as it permits the tracing of the pathological process in the direction it followed in its invasion of the cranial cavity; the necrotic areas are also more easily explored, and the offending primary focus is reached and removed. In this case therefore I planned to investigate first the temporosphenoidal lobe, believing it to be the most probable site of the abscess, choosing for the purpose the mastoid route. I prefer for this work an electrically driven burr. Its use lessens the shock and jar to the skull and brain and it permits of rapid and thorough exenteration of the mastoid.

I made the usual mastoid incision, extending it above the squama. The periosteum was reflected over the mastoid and skull areas. The mastoid was first entered in the region of the mastoid antrum and the antrum uncovered. The mastoid cells were exenterated and the lateral sinus exposed to a sufficient extent to determine the condition of its walls. A circular plate of bone, about 1 inch in diameter, was then removed from the squama over and including the temporal lobe and the zygoma.

CLINIC OF DR. KELLOGG SPEED

COOK COUNTY HOSPITAL

BURNS

Summary A study of 496 cases of burns. First-aid treatment and subsequent management. The treatment of shock as important factor. Treatment of burns in children. The ambrine method—technic of application.

ALTHOUGH most corporations around Chicago are now compelled by state law to care for their injured employees, there are still admitted to this hospital many patients suffering from burns. Upon questioning these patients especially the children, it seemed that many instances of scalds and burns were unnecessary if a little precaution were taken in people's homes. Also a small amount of instruction in the treatment may help save the patient a long period of painful dressing and disability. With the present facilities for lighting by electricity and the use of gas stoves for cooking there should be theoretically a diminution in the number of burns. A large proportion of the hazards from open fires have been eliminated but there still remain a few houses, especially those whose inmates are admitted to this hospital, where open fires, kerosene or gasoline fuel are employed. Such a serious matter as burns and scalds requires investigation. During the last three years there have been admitted to this hospital over 500 cases of burns. Of these I have studied 496. Out of the total number 326 were burns and 170 were scalds, usually from hot liquids, as water or soup and rarely from hot grease or fat. A review of the histories is a psychologic study. One middle-aged man who had a misunderstanding with his wife had his clothes saturated with oil and ignited by this spouse. He failed to survive. Whether the woman was indicted for manslaughter is not told by the

dema of lungs marked emaciation and anemia almost empty owel large sacral bed-sores marked edema and hyperemia of he leptomeninges foramen magnum pressure furrow of brain tem cloudy swelling of kidneys marked passive hyperemia of ning of bowel, rectum and trachea petechial hemorrhages into ning of the stomach duodenum, and rectum marked fatty ver marked fatty changes of the kidneys myocardium, lining f the carotid, and left coronary arteries and aorta lessened ellow material of the adrenal cortices slight hyperplasia of the pleen disappearing scalp bruises marked coal-dust pigmenta ion of lungs and visceral pleura cavities bilateral fibrous pleuritis abdominal splanchnoptosis, cholecystocholic ligament.

First and second degree burns of trunk, arms neck, and face dema of the leptomeninges superficial bruises of the cerebrum petechial hemorrhages of the cerebrum bruises of the deep scalp issues edematous bruises of torsi, face and arms multiple bra sions of arms, legs, and trunk singed scalp hair absent and nged axillary hair callosed and dirty palms and soles.

Our treatment can be divided into primary and secondary Primary treatment includes first aid and care during the subsequent acute stage until the wound is healed. In this treatment primary skin-grafting and flap transplantation are sometimes necessary Secondary treatment includes all operative and orthopedic treatment, looking toward the avoidance of contractures from scars which will interfere with function It may be necessary to consider these contractures from the very first, and the use of splints and proper position of limb should be employed as soon as they are helpful

Primary treatment must consider first the shocked condition of the patient. Shock is manifested in all burns of considerable extent and the patient may fail to rally from it—dying long before any other direct result from the burn itself could be expected. To avoid any additional shock after the burn has taken place the patient must be quietly yet quickly handled, wrapped in blankets to preserve body heat, given strong sedatives to relieve pain and stop hysteric motions and thrashing about. Also to guard against pain, the removal of adherent clothing

history. Domestic disputes were frequently settled by burns received by one party or the other. A favorite method was to drench the opposing party with boiling lard or grease, and in one case a father becoming angry with his seventeen-year-old daughter burned her by this method so that she died. One woman fifty-five years of age on a certain cold day sat on a hot flat iron to get warm. She remained there until in pain and died one month later as a result. Yet another woman was taking a steam bath over a home-made heater. She became overcome with the heat and was powerless to move. Her husband found her after several hours, but her burns were so extensive that a fatal termination followed.

Many children suffered burns from playing about heaters. Others received severe scalds from the tipping of kettles of boiling soup or water and others sustained serious scalds when sent to fetch the boiling coffee pot from the stove. Older children frequently upset hot water on babies, or small children fell into open tubs of hot water. One child was bathed in too hot water by a midwife immediately after birth, death resulting in twelve days.

Among the 496 cases there were but 2 *x*-ray burns. Alkali burns were 4 in number, acid burns, 8. Gasoline and benzine accounted for 8 burns, while there were 5 electric burns, mostly from handling live wires. One severe burn resulted from a child playing in the dark with rat poison, which was luminous on account of its phosphorus content. Tetanus followed one burn.

In the 496 cases there were 151 deaths, a mortality of 27 per cent. Of the total number of deaths, 70 occurred in children five years of age or younger. A large proportion of the deaths occur within thirty-six hours after injury. These are the result of shock, a most difficult factor to combat. Deaths following after several days or weeks can be attributed to nephritis, exhaustion, infection, and bronchopneumonia. The autopsy findings in 2 average cases were:

Third degree burns of the neck, trunk, face, left shoulder and hand; beginning bronchopneumonia; marked hypostatic

must be done only when a proper dressing can be applied, so that as little disturbance as possible is made of the burned area If the pulse is weak, stimulating enemata of hot coffee are indicated, provided the buttocks are not burned.

Shall we institute a first-aid dressing for these burns? For merly carron oil was extensively used, the combination of the alkaline lime-water which neutralized the acid products of the burn and stopped pain, aided by the linseed oil covering to exclude the air was presumed to be almost ideal. It is very difficult to sterilize carron oil and to keep it sterile when not frequently used. Burns are sterile immediately after formation and all subsequent infection is carried on to them from without. To preserve the sterility left by the causative heat, picric acid in 5 per cent. aqueous solution has been much used. In the British Navy it is used as a first dressing for the serious burns incidental to warship management. In civil life it can also be used. It is a strong antiseptic solution. I use it in alcoholic solution instead of iodin to sterilize the skin before operation. It penetrates, leaves a cool, clean skin, and does not tend to vesicate as iodin solution does. Various other first-aid dressings have been employed. A heavy layer of vaselin or liquid petroleum, poured over the burn wound and covered with gauze, and aqueous solutions of 5 to 10 per cent. of sodium bicarbonate, covered with gauze dressings boric ointment, normal salt solution, hydrogen peroxid, and many other materials have been used. Most treatments which need an additional gauze or cotton protection cause severe pain when the dressings are removed

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Fig 315.—1 Healed burns of hands, face and back. No effort was made to avoid contracture of left wrist This has since been corrected by plastic flap operation on the left forearm which permits the hand to come into full extension. 2, Healed body burns. A strong cicatrix binds the left arm to the chest, deformity easily avoided if preliminary orthopedic thought had entered the mind of the surgeon. The arm was freed, maintained in complete abduction, and the denuded area has since healed over without skin-graft. Adhesive tape dressing 3 Back view of No. 2, showing extent of binding scar 4, Fresh burns healed in the tented beds by electric light and application of 5 per cent argyrol. Recovery 5, Nearly healed burn of buttocks. Adhesive tape treatment on residual areas. 6, Healing burn of back. Under adhesive tape dressing this has now been completely epidermized.

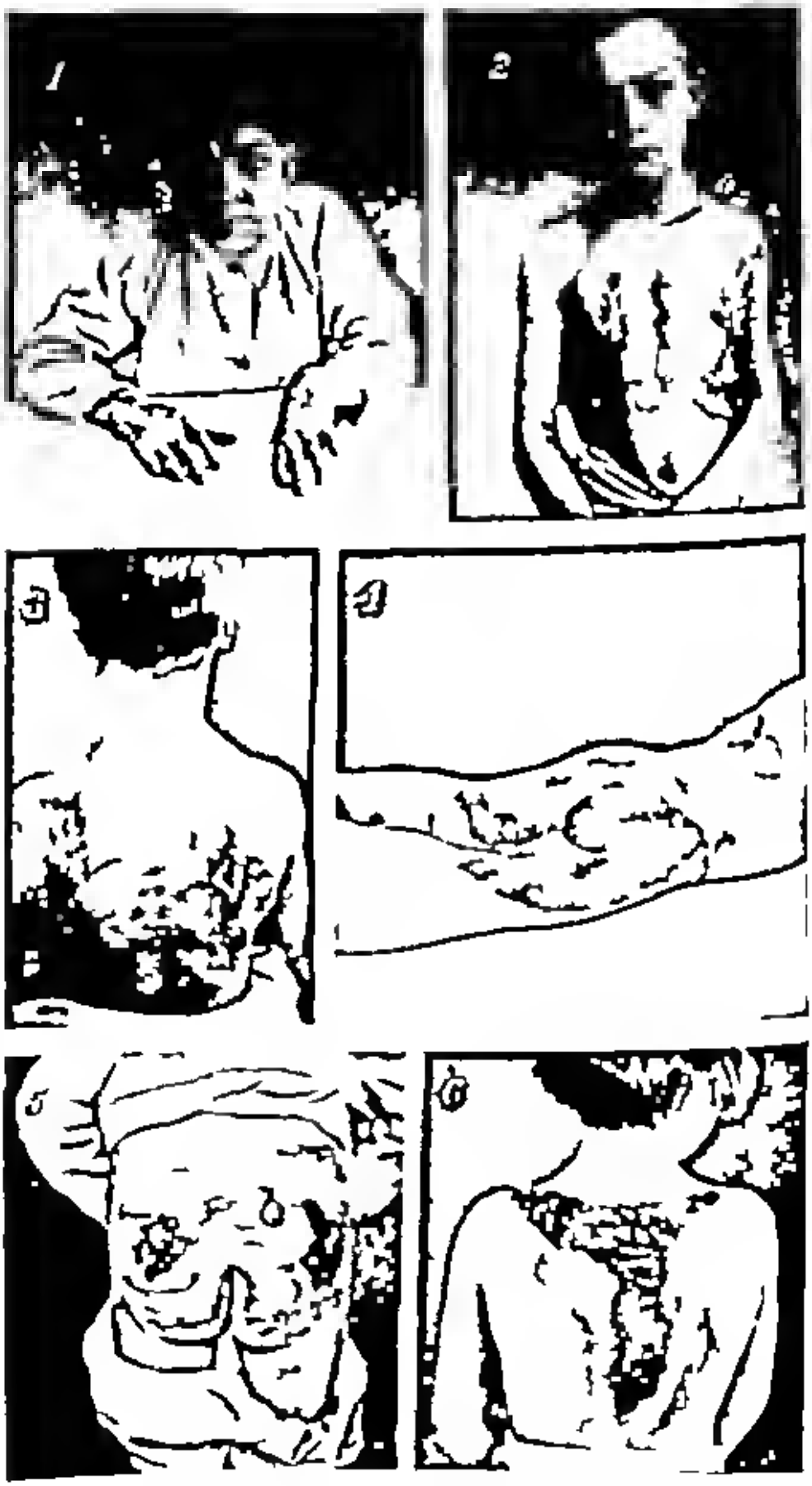

Fig. 315

obtained by de Sandfordt at Issy-les-Moulineaux during the war but by the ratification of American surgeons.

On our service in the County Hospital we use two methods—this closed method with ambrine, and the open method, applying 5 per cent. argyrol to the burned areas. In younger children we find that ambrine will not stick satisfactorily the children pull at the wax or turn about, so that its protective value is lost. For these patients we use an ordinary child's bed with high sides, enclosing the whole in sheets which permit entrance through a flap on one side. In this tent like arrangement we hang an electric light, which furnishes both heat and light. The youngsters are stripped and are placed in these beds on sterile sheets. The heat from the light keeps them comfortable and dries the burns, which are daintily touched three times a day with 5 per cent. argyrol. If the back is burned the child lies prone if his abdomen or chest is burned he lies supine. When there is a tendency on account of the location of the burn for an arm or leg to contract, we tie it loosely to the bed end or side and tilt the bed in the opposite direction. There are no dressings to be done the sheet in the bed must be changed as often as needed. Scabs and crusts are not picked off they are allowed to dry and come away of themselves. When the patient recovers sufficiently to become ambulatory the remaining granulating area is treated by the adhesive tape method, laying on narrow strips to completely cover the granulations, never cauterizing them and changing the tape every second day We have to do very few skin-grafts. In general, the closed method with ambrine is the best treatment, and should become a national standard treatment until something better appears All burned individuals should be hospitalized. The technic of the ambrine method is as follows

No matter what type of burn is present the area is thoroughly dried by an electric hot-air dryer such as barbers and hair-dressers employ A coating of ambrine is then applied by means of an atomizer or fine brush, covering the burned area completely and extending ¼ to ½ inch beyond on to normal skin. A thin layer of cotton, or a single layer of sterile coarse meshed

after the patient reaches the hospital for permanent treatment. Gauze is bad enough, but cotton stuck over a burn leads to great difficulty in removal. It is better in the long run to leave the burned area uncovered by dressing. Picric acid is the most useful first-aid application when one is needed. If the patient can be taken very quickly to a hospital, the first treatment which inaugurates the permanent treatment can be given there.

Frequently the patient is in such extreme shock that little attention is paid to the actual burn. Rest and stimulation are necessary. If the patient is in pain, morphin is indicated. Sometimes they are completely apathetic and have no complaint, but are in extreme shock. Hypodermoclysis is not suitable, intravenous administration of normal salt or 5 per cent. sodium bicarbonate solution being the best procedure. When the buttocks are not involved, stimulating enemata may be given. To decrease pain, continual complete warm baths of sodium bicarbonate solution may give relief. However the results are no better than in dry treatment. Dry methods, some combined with open-air treatment, have been popular at times. Burned areas are powdered with zinc stearate or boric acid or other mild powders, and the resulting crusts being left in place favor epidermization. Sometimes these powdered areas are covered with dressings; at other times they are left to the desiccating effect of the open air. Every one claimed good results for the treatment, but few told of their mortality and the exact amount of pain and distress the patients suffered.

No standard treatment is offered. American surgeons—every known application and method has its deficiencies. The method of choice is one which relieves pain and induces rapid healing with a minimum proportion of resulting cicatricial tissue.

About thirty years ago Barthe de Sandfordt, in China, developed his mixture of paraffin and resin which was marketed under the name of ambrine. This patented preparation did not become popular in America until men like Sherman, who dealt with many burns, took it up and verified its merits. This use of ambrine is called the closed method of treatment of burns, and its value has been firmly established not only by the results

CLINIC OF DR CARL BECK

North Chicago Hospital

SUTURE OF NERVES AND TENDONS OF THE WRIST

Summary Paralysis of the media and ulnar nerves the result of cutting the wrist ith glass. Two attempt t secure functionat ng hand prac tically successful.

This young man is nineteen years old He had the misfortune to cut his wrist by glass falling from a door The physician who was called immediately tried to unite the structures which had been severed, but evidently without success Several months later he developed a paralysis of the median and ulnar nerves a painful scar and consequently loss of function in the afflicted areas.

An attempt is made at this late period to re-establish function by restoring the continuity of the nerves and tendons The scar over the wrist is very carefully resected and it is found that the flexor tendons are connected with the ligamentum carpi and that the peripheral ends f the tendons are retracted toward the inner part of the hand The ulnar nerve has been severed below the pisiform bone and the ends are embedded in scar tissue. It is ery difficult to find the peripheral end After considerable dissection we find the very thin end The proximal end is easily dissected. It is however hardly possible to bring the two ends together and we therefore use a silk thread to unite them as close as possible We surround this bridge with a piece of fascia taken from the fascia lata surrounding the two nerve ends with a sort of sheath of fascia with its fat adhering to it leaving the fat inside of the new sheath

The tendons of the fingers are easily brought downward and united not singly however but in bunch of the proximal tendon end. This extends the flexed portion of the fingers.

Somewhat easier is the union of the severed median nerve After dissecting all the scars we are able to unite the two ends

gauze is laid on the paraffin, and this is covered with another layer of the wax put on either with a brush or atomizer and allowed to stiffen. This forms a waxy shell over the burn and protects the underlying part from the air keeping it at a uniform temperature. It also promotes a rapid epidermization by acting as a protecting scaffold along which cells can grow It also acts as a splint for the part and prevents contractions and cicatrization. Within twenty four hours the secretion beneath the wax causes it to be elevated slightly and it can be easily and painlessly removed without destroying the proliferative epithelium on the surface beneath. The wound is again thoroughly dried and the wax reapplied. Any specially deep or suppurating points are sprayed with 50 per cent. hydrogen peroxid or washed out with normal salt solution before the drying.

Ambeine, the exact formula of which is not published, is a mixture of neutral wax and resin. If we do not care to use the patent medicine, we can use a neutral wax or paraffin which melts at 150° F to a liquid almost as thin as water This can be sterilized by heating to 250° F for ten minutes, and is then used on the perfectly dried wound by means of an atomizer which has a water jacket. The spray of paraffin is applied at 150° F This wax must not be brittle and must be ductile enough to spread out. This dressing is applied daily for three weeks. When infected burns with crusts and discharging pus are received they are treated by the Dakin solution until clean granulations form then the wax application follows. The tissues should never be scrubbed or subjected to strong antiseptics, nor should granulations be cauterized.

It has been suggested that various stimulating medicaments should be added to the wax. Resorcin, oil of eucalyptus, beta-naphthol, boric acid etc. have been tried, but it appears to be proved by Sollman's experiments that these substances are held inert in the wax and fail to have any action on the underlying granulating surface

very snugly We also surround this united nerve with a sheath of fascia and fat taken from the fascia lata The arm is placed at absolute rest upon a splint and will be kept in this position for eight days.

After-history —Unfortunately a portion of the skin sloughed out. We very often observe this sloughing following operations of a similar nature. We cannot account for it in this case except that the nutrition of the skin in this neighborhood is rather poor and that the scar formation necessitated the removal of considerable portions of the skin. In many individuals it is necessary to stretch the skin to cover the defect. The skin of the volar surface of the hand is not very pliable and the skin of the forearm has to be stretched all the more. That produces a great deal of strain on the sutures and a necrosis often results.

There was some hyperflexion of the hand but not complete The slight necrosis of the skin led to a sloughing of the fascia, and the result was, therefore, unsatisfactory There was union of the median nerve and the tendons. The ulnar nerve evidently did not unite at least function was not restored after months of after-treatment.

A second operation was done to reunite the ulnar nerve and correct the abnormal position of the fingers (Fig 316 3) This flexion was brought about by the union of the tendons, which interfered somewhat with the stretching of the fingers although physical exercise and electricity were used. The scar tissue was dissected out and the flexor tendons lengthened.

After several months of treatment there is fairly good flexion of the hand and, strange to say the sensation is slowly returning Parts of the fingers are still numb but the largest portion has already acquired sensation.

Fig. 316.—1, Exposure of field and extent of injury Note space between severed flexor tendons due to retraction, also large amounts of scar tissue which has developed around severed ulnar and median nerves. 2, The flexor tendons have been united in group. The ends of the ulnar nerve have been approximated and sutured as well as possible, then surrounded by tube of fascia lata with the fatty side turned in. The median nerve has been repaired in the same manner and lies beneath the tendons. 3 Abnormal flexion of fingers due to union of tendons which was corrected at later operation.

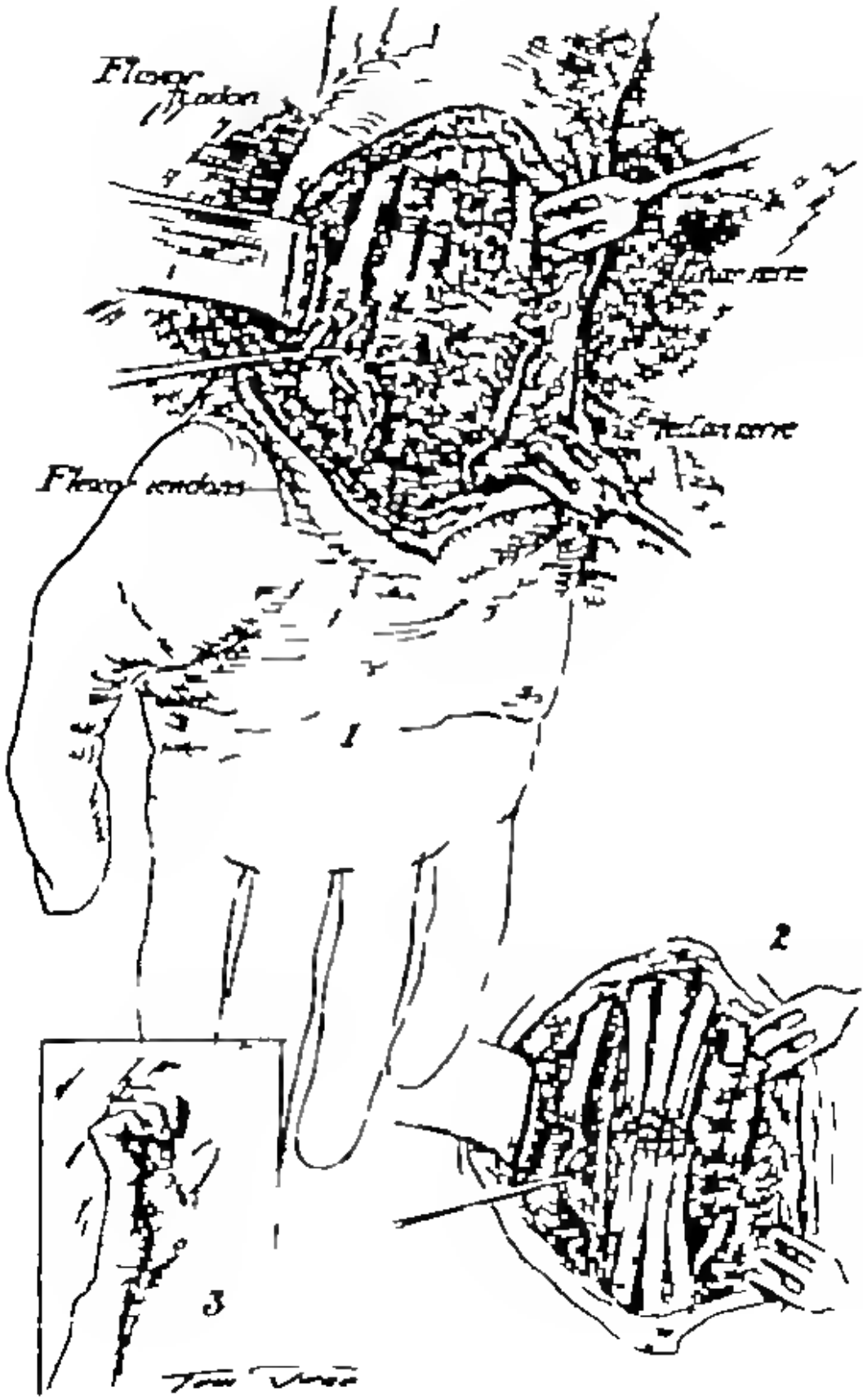

Fig. 316.

CLINIC OF DR. ALFRED A. STRAUSS

MICHAEL REESE HOSPITAL

VARIOUS METHODS OF BLOOD TRANSFUSION AS MOST APPLICABLE IN VARIOUS AGES

Summary Three cases for blood transfusion, each patient representing different period of life. Method of transfusion must be adapted to the age of the patient and the condition of the veins. Technic of methods employed in present cases—direct syringe method transfusion through external jugular vein; transfusion through superior longitudinal sinus. Beneficial results from blood transfusion last longer in children than in adults.

We have this morning 3 cases for transfusion. One is an adult who has been bleeding from a large gastric ulcer of the lesser curvature whom we will transfuse with 1000 c.c. of blood and then operate. The second patient is a child two years old with a hemoglobin of 20 and a red count of 1,000 000 The patient has had repeated hemorrhages from the bowel without a positive diagnosis as to where the hemorrhage is from We believe from our x ray findings that this child has a congenital anomaly about 6 inches from the ileocecal valve, which is either in the form of a benign tumor or a bleeding Meckel's diverticulum. We will transfuse this patient, transfuse a second time within a few days, and then operate on her The third patient is a case of congenital pyloric stenosis in an infant ten weeks old on whom we operated thirty-six hours ago The child is in such an emaciated condition that we can help it along greatly by giving it 75 c.c. of blood.

It can be very readily seen that we have here 3 cases for blood transfusion, each one in a distinct age, that of infancy that of childhood, and that of adult life. A great deal has been written about the various methods of blood transfusion, and many arguments have been brought forth by different individuals

of the advantages and merits of one method over the other As a matter of fact, there is no one method of blood transfusion that is applicable to these various ages one method which is very practicable in an adult is impossible in an infant, and a method that is applicable in an infant is not applicable in a child. In other words, I would like to demonstrate that each individual age should have some particular method For instance, in adults with large veins, especially if both the donor and recipient are males and you have an intelligent assistant, one who is able to prepare your paraffin tube properly then the Percy paraffin tube method is as practicable and simple as any one method known. On the other hand, if the donor is a female with small veins, the Percy method is not as easy and practical as the direct syringe method which we will demonstrate this morning on our first patient, the bleeding gastric ulcer The technic is as follows

A sphygmomanometer is placed on the donor's arm as high up above the elbow as possible. The column of mercury is held at 40 so as to obstruct the venous circulation and not interfere with the arterial. The skin area over the oblique vein is now injected with ½ per cent. cocain and the vein exposed (Fig 317 1) The vein is now ligated on its proximal portion. A grooved director is placed underneath the vein and a second ligature placed on the distal portion (Fig 317 1) The area around the wound is soaked with sodium citrate solution, 2 per cent. strength. The upper circumference of the vein is now lifted up with a pair of small toothless tissue forceps and an oblique cut is made with a pair of fine scissors (Fig. 317 2) A closed cannula with its plunger is placed in the vein, holding the upper lip of the vein open by means of an Elsberg hook (Fig. 317 3) The cannula is now tied with the second or distal ligature (Fig 317 4)

Fig. 317.—1, Oblique vein exposed and ligated for transfusion by direct syringe method. 2, Incision into vein. 3 Closed cannula with plunger placed in donor' vein. Upper lip of vein held open by an Elsberg hook. 4, Cannula tied with second or distal ligature. 5, Method of transfusing an infant through superior longitudinal sinus. The Braun needle is inserted obliquely into the superior longitudinal sinus and is prevented from going through the sinus by small fixed metal knob, situated ¼ back from the point of the needle.

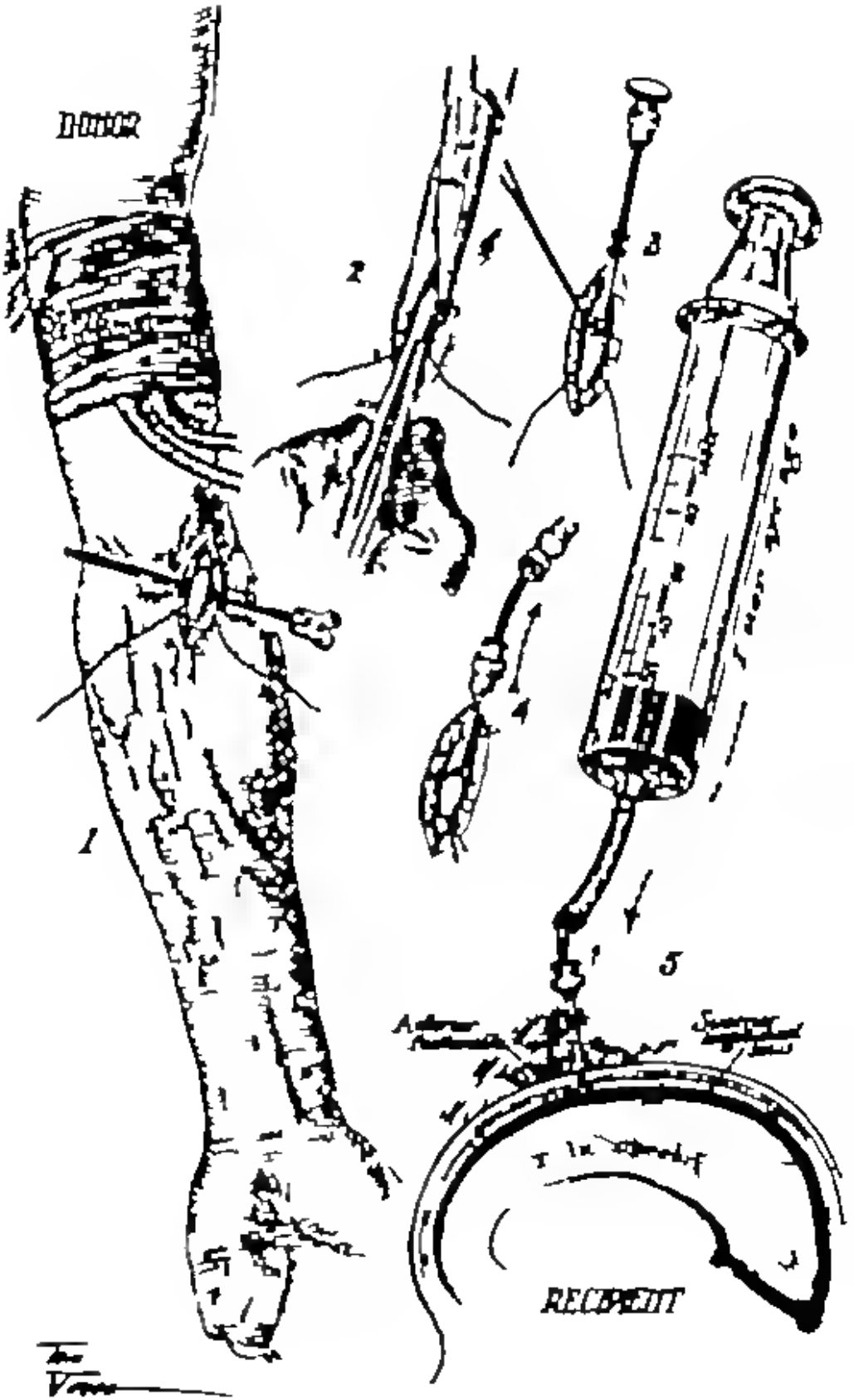

Fig. 17

transfusion is given, and then operation performed. To my mind this is much better than to give a child in such a precarious condition one transfusion and then operate.

In a child two years of age it is very difficult to get a vein in the arm that will do for transfusion. For this reason I believe the external jugular is the simplest and best vein to use (Fig

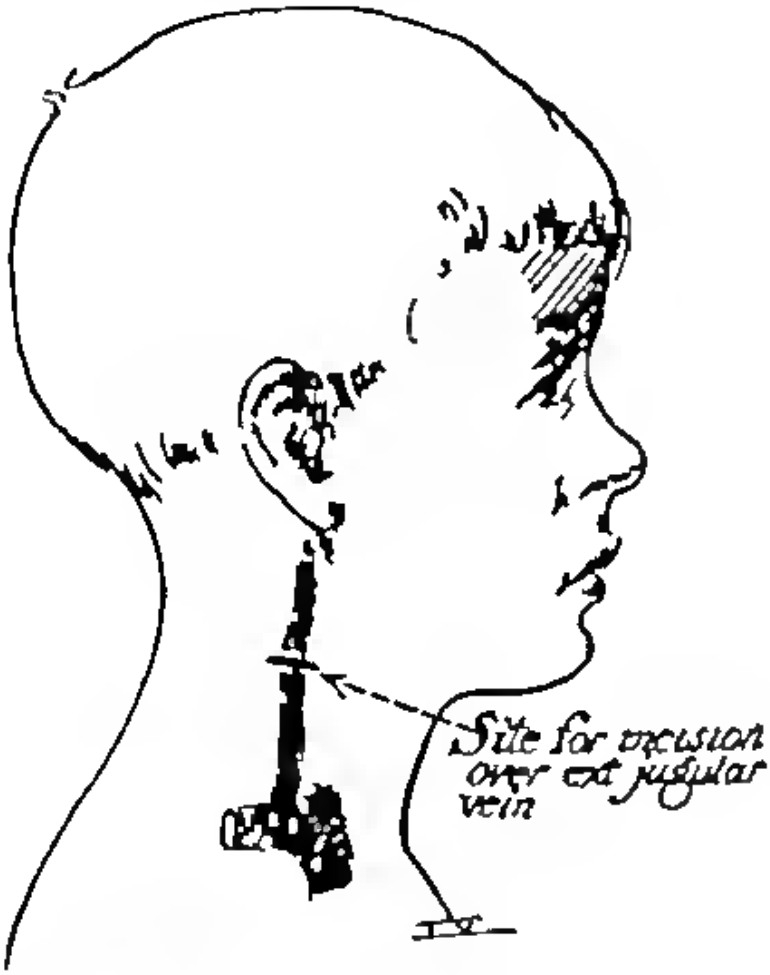

Fig. 318.—Transfusion through external jugular vein. This method is employed in infants where the anterior fontanel is closed and in children up to six years of age.

318) I use the external jugular in all infants where the anterior fontanel is closed and in children up to six years of age. The method of transfusion is exactly the same as I described in the first case except that the cannula in the recipient is placed in the external jugular vein. In a child of this age usually 150 to 250 c.c., varying with the size of the child is sufficient in other

A cannula is inserted in the recipient's vein in exactly the same manner and with the same technic as in the donor except that the cannula is pointed in the opposite direction, namely, toward the proximal portion, in the direction of the flow of blood in the vein. Both wounds are covered with a sponge saturated in sodium citrate solution.

Two 100 c.c. Luer syringes are now washed out in sodium citrate solution and a small rubber tube, about 1 inch in length, is attached to connect the syringe to the cannula. It is well for the donor to constantly work his hand and the muscles of the forearm so as to distend the veins with blood. The plunger is pulled out of the cannula, the rubber tube connected, and the blood drawn off 100 to 120 c.c. at a time. The plunger is now replaced and the plunger from the cannula in the recipient's vein is pulled out and the blood transferred. The object of having two syringes is while one is being used the other one can be washed out with sodium citrate solution. The object of washing the syringe in sodium citrate is that it leaves a fine capillary layer of sodium citrate in contact with all parts of the syringe and prevents any tendency to blood clotting. In this way no time is lost. There is one advantage of the 100-c.c. syringe method, namely that the patient does not get a large volume of blood at one instant, but is getting 100 c.c. at a time which will not overtax the circulatory capacity or the heart. I believe this has some advantage over the Percy method, in which 800 to 1000 c.c. of blood are passed into the circulation within a few minutes. In the method we are employing this morning there is always an interval of two minutes between each injection of 100 c.c. of blood.

The next patient is the child two years old, with very low hemoglobin and very low red count, whose general condition is so bad that I believe two repeated transfusions will fit the child much better for operation than one single transfusion. I have done this repeatedly in young children in whom I had to do major abdominal operations. In a patient where the hemorrhage is a slow oozing type if transfusion is done he will eat, drink, and pick up very markedly for five to eight days, when another

easiest method of transfusing infants. In children where the fontanel is closed the external jugular should be used by the above-described cannula-syringe method In children over ten years of age the veins in the arm can be used In adults who have very large veins the Percy method is ideal. Where the donor has small veins the cannula Luer syringe method is much simpler

Just a word regarding the grouping of donor and recipient as to their compatibility I believe this is very important in adults and children, but absolutely unnecessary in infants. I would like to call your attention to the fact that in all transfusions we have done in the newborn and infants up to one year of age we have never tested or grouped the blood for hemolysis and coagulation, and we have never had any ill results from such transfusions. We usually use the mother or father of the infant as the donor

In general, transfusions in children up to twelve or fifteen years of age seem to hold longer and last much better especially in the anemias, than in adults. This is hard to explain except on the basis that the red cells and chemical substances in the plasma of the blood are able to adjust themselves to the new blood in the young individual during this developmental stage much better than in the adult where the plasma and red cells have reached greater maturity in development. We have also noticed that in chronic anemias where we have used from time to time four or five donors for the same recipient although the grouping of blood as to hemolysis was proved, the end-results of such transfusions from the various individuals differed very markedly For instance, a transfusion from one donor would hold in the individual for four to six months, while in the next transfusion from another donor although of the same group, the recipient would be anemic within four to six weeks. I believe, therefore, that there is some other chemical equation and finer chemical changes, probably in the plasma of the blood which we should look for in the grouping of bloods to make them compatible.

words, all that we need here in this patient this morning is about two syringefuls of blood.

The third case is the infant ten weeks old. On account of his impoverished condition and low vitality I feel that I can help his vitality greatly as I have done in many cases by giving 50 to 75 and occasionally 100 c.c. of blood.

Now the simplest method of transfusing such a child is through the superior longitudinal sinus. The landmark to insert the needle is the posterior portion of the anterior fontanel where the two parietal bones meet in the midline. We believe that in these young infants the chemical changes which produce non-compatibility such as coagulation and hemolysis are not present, and for this reason we have always used the practical method of taking the blood from the mother. We have transfused a very large number of infants not only for this condition but for many other conditions, such as anorexia, malnutrition, and anemias of all forms, and at no time have we ever tested the blood of the donor and recipient as to their compatability. In no single instance have we ever found any bad results therefrom. 50 to 75 c.c. of blood are withdrawn from the mother's vein by the needle or by the cannula method such as I demonstrated in the previous cases, and while the assistant fills the syringe from the donor I plunge the Brown needle (Fig. 317, 5) into the superior longitudinal sinus. The landmark for placing this needle is on the posterior portion of the anterior fontanel where the two parietal bones meet in the midline. The needle is inserted obliquely and is prevented from going through the superior longitudinal sinus by a small fixed metal knob situated ½ inch from its point (Fig. 317, 5). If the needle is in the superior longitudinal sinus you will get a free run of blood with a fair amount of force. If there is simply a small oozing of blood the needle is not in the sinus. The syringe is now attached to the Brown needle and the blood transferred. I believe this is a very simple and practical way of transfusing infants. We have transfused a very large number of them and we do the transfusion right in the dressing room with very little preparation.

I believe when the fontanel is open this is the simplest and

CLINIC OF DR. ALBERT J OCHSNER

AUGUSTANA HOSPITAL

RUPTURE OF GALL-BLADDER INTO DUODENUM

Summary Patient complaining of chills and vomiting is found at operation to have a rupture of the gall-bladder into the duodenum with large stone lodged in the duodenal opening Operative treatment.

THIS patient, A. S. No. 61,933 came to the hospital March 2, 1920 complaining of chills associated with vomiting There is no pain associated with these attacks nor is there any regularity as to occurrence. No relationship to the taking of food is found. These attacks began about one year ago At first they came on about once a month, seldom oftener Recently the attacks have come at shorter intervals of from a week to ten days. The patient has never been jaundiced and he has never noticed any clay-colored stools during or after these attacks. The vomitus consisted of whatever he had eaten at a previous meal, and rarely was there a greenish hue to it.

Past History —Thirty years ago patient had typhoid fever There were no complications. The patient has been told that he had a slight attack of diabetes for the last five years with only a slight trace of sugar in the urine. Appetite is fair Weight has remained the same, bowels are slightly constipated nocturia twice during the night.

Marital—Patient has been married thirty years wife is living and well 5 children living and well. There have been no miscarriages.

Family History —Mother died of tuberculosis of the bowels. Father died of Bright's disease. Otherwise the family history is negative.

Differential count shows 18 per cent. small mononuclear and 56 per cent. large mononuclears

Repeated smears stained with Wright's stain were negative for Plasmodium malaria.

Chills and vomiting are rather an odd combination. Malaria would cause the chills and vomiting but there is no regularity of occurrence, as is usual with the different forms of vomiting Blood-smears reveal no parasites. Brain tumor can be ruled out because there are no symptoms of brain tumor the vomiting is not characteristic, there are no headaches, vision is not impaired, pulse is full and regular and there is no papillo-edema. Appendicitis might cause this train of symptoms, but he has never had any pain associated with the chills and vomiting However this does not rule it out. On physical examination there is no tenderness in McBurney's region. So to all intents and purposes, the appendix is not the offender

The crises of tabes often cause a similar complaint, but in this patient the knee jerks are active and equal, the pupils show no sign of lues, there is no history of lues, and the marital history is negative.

Pylorospasm due to an infected gall-bladder or appendix has to be considered. This may cause the vomiting The appendix has been ruled out and this leaves the gall-bladder The patient had typhoid fever thirty-five years ago so we would think of an infected gall-bladder with stones. This could cause a pylorospasm with vomiting An obstruction is to be thought of, but the history would rule it out. It would have to be intermittent and low down.

From the physical examination, the history of typhoid, and the fluoroscopic examination we get clews that point to the gall-bladder The tender point in the abdomen is over the gall-bladder Whether there are stones is difficult to say but an impacted gall-stone low down in the neck of the gall-bladder frequently gives rise to the symptoms we have in this case. There have been no clay-colored stools or attacks of pain, so apparently the bile is being delivered to the gastro-intestinal canal, although this occurs very frequently in the presence of gall-stones.

Physical Examination.—Patient is a well-developed and well nourished adult male.

Head.—Scalp is negative, no points of tenderness. Ears are negative pupils are equal, regular and react promptly to light and accommodation. Sclerae are clear

Mouth.—All teeth are missing in upper jaw Lower teeth are in a fair state of preservation. Tongue, tonsils, and pharynx are negative.

Neck.—Negative to examination.

Chest.—Lungs are clear Heart is not enlarged. Heart sounds are clear and regular and there are no murmurs. Pulse is equal and regular 86.

Abdomen.—There is some tenderness to palpation below the right costal arch over gall-bladder A second tender point to palpation is over duodenum No masses can be felt. Liver spleen, and kidneys are negative Orifices are negative.

Genitalia are negative

Rectal.—Few external tags are present. Sphincter has good tone.

Prostate is negative.

Extremities are negative.

Reflexes are equal and active

Fluoroscopic Examination.—The chest reveals no pathology The barium meal enters the cardia readily The stomach is of a steer horn type and moderately large. There are no indurations or tender points The peristalsis is normal The duodenal cap is readily seen and is regular but over the duodenum the patient is quite tender to palpation. This is also true over the gall-bladder area. The stomach is mobile, but the duodenum is somewhat fixed.

Roentgen Diagnosis.—Cholecystitis, chronic with adhesions to the duodenum.

Laboratory findings Urine twenty-four hour specimen, 2160 c.c. specific gravity 1 005 alkaline Albumin and sugar negative microscopic examination negative

Blood Erythrocytes, 4 450 000 leukocytes, 11,500

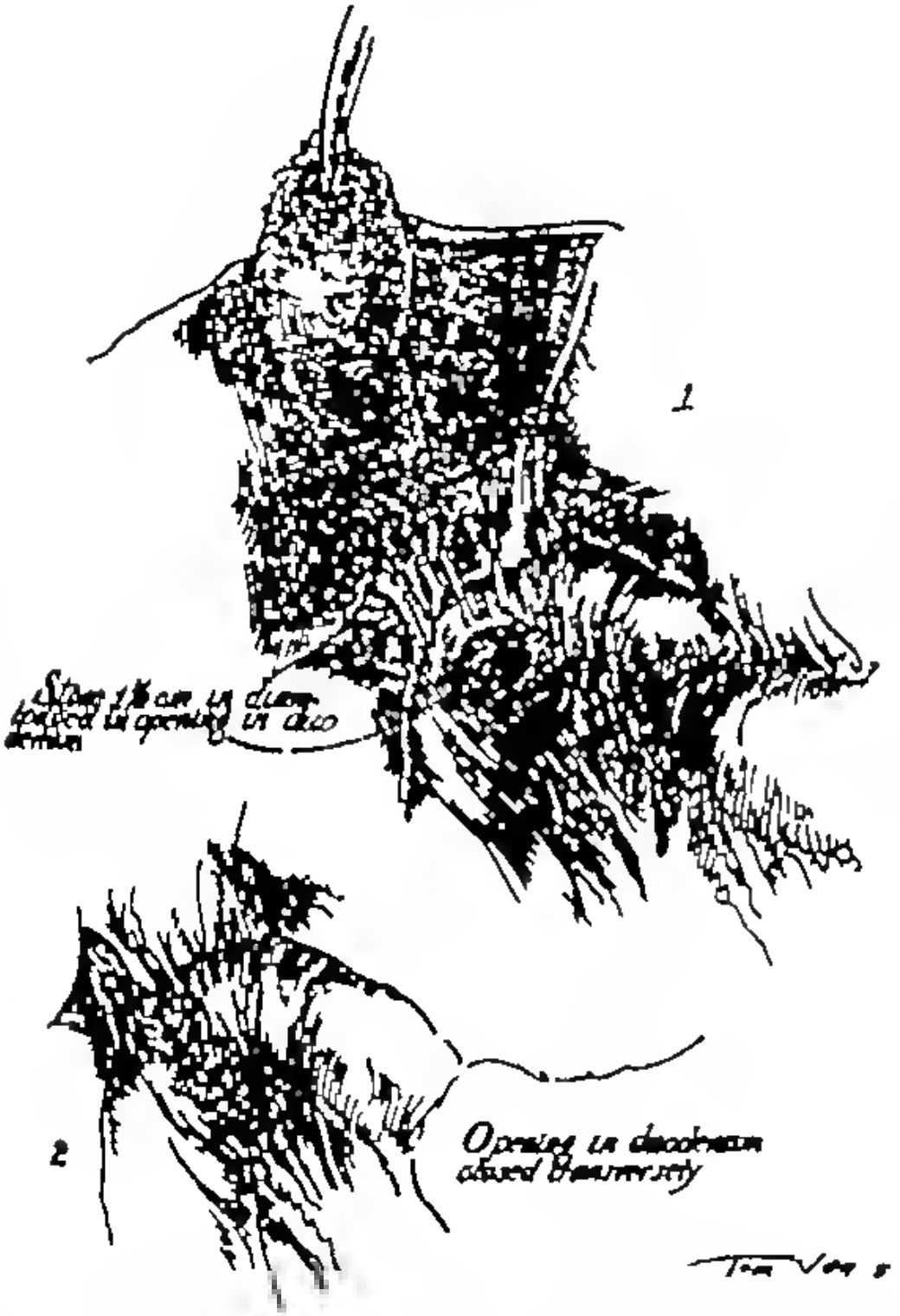

Fig. 319.—The gall-bladder which was adherent to the duodenum is here shown freed and lifted up revealing the rupture into the duodenum and large stone lodged in the duodenal opening. 2, Hole in duodenum closed transversely.

There is some infection, as evidenced by the leukocytosis. Taking all the facts into consideration, we are brought to the diagnosis of a chronic cholecystitis with gall-stones and adhesions causing a severe pylorospasm.

Active diabetes has been ruled out by repeated urine examinations, the patient having eliminated sugar from his diet for a considerable period and reduced the consumption of starch to a small amount.

The patient's suffering is so extreme and his general condition is failing so rapidly and to so marked an extent that surgical interference is indicated.

Although the patient has not lost much in weight, both he and his friends and the physician in charge are convinced that the patient's condition is rapidly becoming serious.

It is possible but not likely that the irritation caused by the long-continued presence of gall-stones has given rise to the development of carcinoma aside from the adhesions. Neither the character of the chills, the absence of pain, nor the appearance of the patient speak for the presence of carcinoma.

In cases of this type it is always wise to operate at the earliest date possible because there is no possibility of spontaneous cure, and while one procrastinates the patient loses in strength and his resistance is weakened by the absorption of septic material from the infected gall-bladder.

Operation.—The patient is asleep and the abdomen relaxed. We will make a high right rectus incision for then it is possible to examine the lower abdomen. The abdomen is open and you see a mass of adhesions. By carefully examining we find that the duodenum liver omentum and the hepatic flexure of the colon are adherent. I will extend the incision down 1 inch and examine the appendix. It is small and cicatricial, with few adhesions. It is much better out, so I will remove it. It takes just a few moments, and you are never sure as long as it remains in the abdomen when it will again cause trouble. Loosening these adhesions and ligating all bleeding points, I find that the gall-bladder is adherent to the duodenum. By catching these adhesions between forceps it may be possible to free the gall-

on the skin sterile vaselin is applied to prevent any irritation of the skin. The tube will be allowed to remain about ten days.

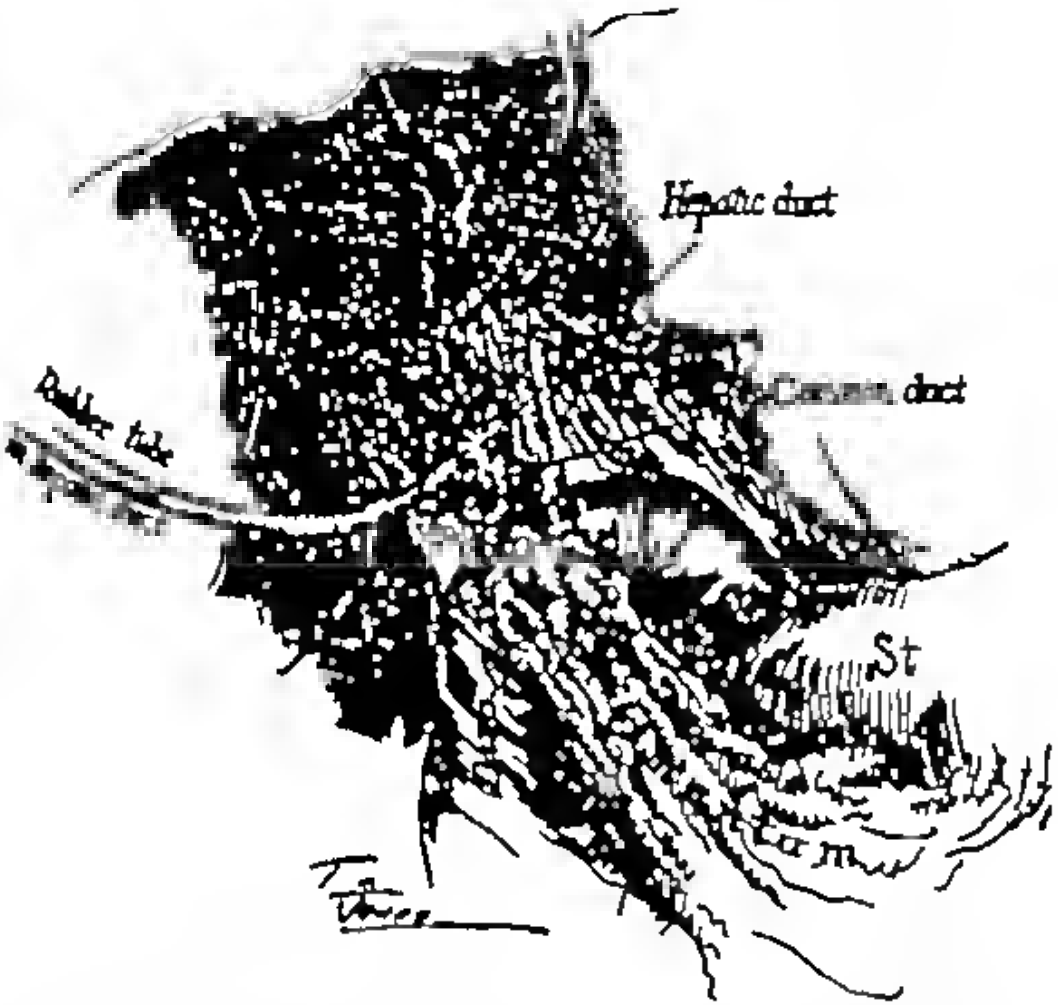

Fig. 370.—A strip of omentum has been sutured over the duodenal repair. The gall-bladder has been removed and the cystic duct split down to the common duct and rubber tube placed in the hepatic duct and sutured.

The cigarette drains will be loosened about the fifth day and gradually drawn out.

bladder Before that is done I will pack these gauze spon around the field of operation so as to wall off the rest of t abdomen. If any infectious material or bile escapes it will taken up by these sponges. In trying to separate the adhesi the gall-bladder suddenly comes loose from the duodenum, a you can see that the gall-bladder had ruptured into the d denum (Fig. 319 1) In the communicating opening of t duodenum there is a gall-stone 1½ cm. in diameter which we remove. The opening in the duodenum is closed with Lembert sutures of silk, the suture line extending transversely in order not to narrow the lumen (Fig 319 2) The gall-bladder is atrophic and will never return to normal, so I will remove it. This will be quite difficult, for with all these adhesions and inflammation the tissues are very friable. First freeing the adhesions and tissues around the cystic duct, so that the hepatic and common ducts are located, I will sever the cystic duct above its junction with the hepatic. The cystic artery is caught with a round-nosed forceps, the forceps pointing toward the fundus of the gall-bladder This will prevent catching the hepatic duct. The gall-bladder can now be shelled out. The cystic artery is ligated, but the cystic duct cannot be ligated because the common duct will not carry the bile. It is edematous and indurated and we must allow time for the inflammation to subside. A rubber tube is inserted into the hepatic duct after the cystic duct has been split down to the common duct (Fig. 320) The tube is sutured with fine catgut so as to hold it firmly in place. The bile is already escaping through the tube. Around this tube are placed four cigarette drains. These drains, together with the rubber tube, are brought out through the upper end of the wound. It is impossible to explore the common duct because of the induration and adhesions.

Before closing the abdomen small tag of omentum is sewed over the suture line of the duodenum to prevent any new adhesions from forming and also to take care of leak if one should occur (Fig. 320)

The abdominal incision is closed in layers, silkworm-gut sutures being used for tension sutures. Around the drains and

CLINIC OF DR. DANIEL N EISENDRATH

MICHAEL REESE HOSPITAL

INFECTIONS OF THE KIDNEY[1]

Summary *Case I*—Perinephritic abscess secondary to carbuncle on neck drainage of lesser persistence of symptoms necessitating nephrectomy recovery

Case II—Hyperacute exacerbation of chronic pyelitis of the pelvic pelvis—erroneously diagnosed as gall-stones medical treatment of no avail; nephrectomy with recovery

Comments on renal infection—advisability of allowing nephrectomy incisions in these cases of severe infection to close by second intention. Routes of invasion in renal infections and causative organisms—pathologic changes in the kidney in these cases.

THE 2 patients whom I will present today illustrate different types of renal infection, a subject with which every one should be thoroughly familiar The first case is an example of how a relatively insignificant primary lesion like a carbuncle on the neck may jeopardize the life of the individual as the result of a secondary metastatic focus in the kidney The second case reveals the difficulty of cure in chronic pyelitis, and how the carrier of such a condition is constantly menaced by the dangers of acute exacerbations with spread of the infection to the kidney parenchyma.

CASE I. PREOPERATIVE DIAGNOSIS PERINEPHRITIC ABSCESS (RIGHT) SECONDARY TO A CARBUNCLE OF NECK

Six weeks before I first saw this young man in consultation in an adjacent city a furuncle had appeared on the back of the neck. The focus of suppuration gradually became larger until a carbuncle formed, which required incision. About two weeks after this the patient began to complain of a dull, aching pain in

[1] This is the first of a series of clinics by Dr Eisendrath on Infections of the Kidney The remaining ones will appear in subsequent numbers.

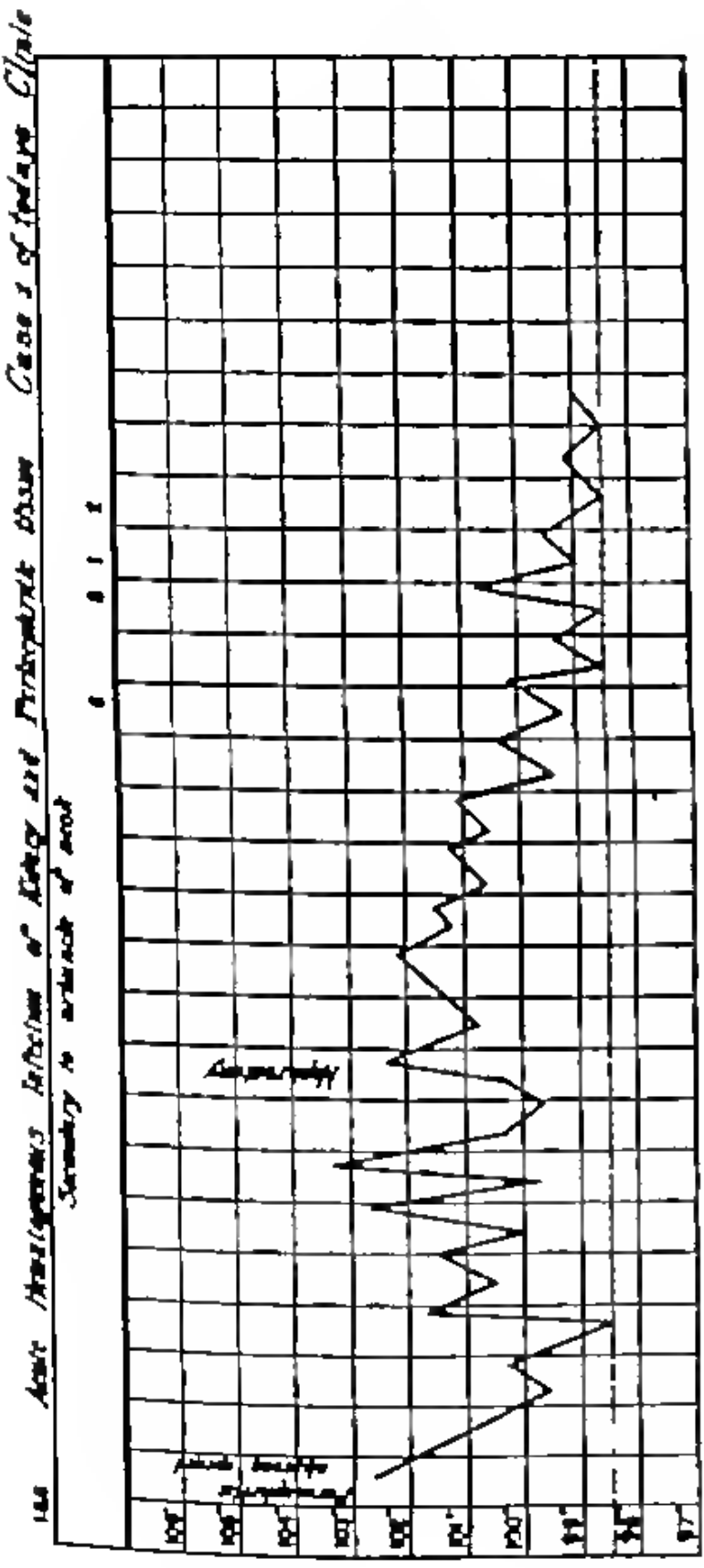

Fig. 321.—Temperature chart from Case I. Note fall of temperature following opening of perinephritic abscess, but owing to the fact that the underlying cortical focus (see Figs. 322 324) had not been controlled the temperature promptly returned.

the lumbar region of the back and over the right upper quadrant of the abdomen. The diagnosis was made of an appendicitis, but changed later to that of a pyelitis. For two weeks before being seen by me in consultation the temperature had ranged from 100° to 102° F. The white blood count was 27,000. The urine contained a small number of pus-cells. A radiograph of the right side of the abdomen failed to show any definite evidences of a subphrenic abscess or of any change in the kidney shadow except an irregularity of the lower pole and a slightly higher right half of the diaphragm.

When first seen, percussion of the right lower chest revealed a level of liver dulness which was a little higher than normal and a minimal degree of excursion of the lower border of the right lung. There was a sudden cessation of the tactile fremitus at the same level at which the dulness began. As I have shown in a previous lecture[1] on the complications of appendicitis, such findings should arouse one's suspicions as to the possible presence of some condition in the right upper quadrant which has pushed up the corresponding half of the diaphragm.

Abdominal examination failed to reveal any rigidity even over the iliocostal space but the right kidney was distinctly palpable and tender. The temperature was 103° F. rectal, pulse 124 and the young man appeared extremely ill. A diagnosis was made of right-sided perinephritic abscess and removal to this hospital advised.

Upon arrival here the temperature was found to be 102.6° F. (Fig. 321). The localizing signs were not any more definite than when first seen at his home. The tenderness (deep seated) over the right kidney was still present, but muscular rigidity was absent. A radiograph showed a displacement upward of the right half of the diaphragm.

Cystoscopy revealed a normal appearance of both ureteral orifices. Only the left ureter was catheterized, because all we desired to know was whether the functional capacity of this kidney would suffice in case removal of the right one became necessary. This question having been decided satisfactorily as

[1] Surgical Clinics of Chicago, Vol. I, No. 5, p. 1014, Oct., 1917.

quently such a perinephritic abscess is secondary to a localization of the organisms in the cortex of the kidney with extension either by way (*a*) of the lymphatics which pass through the fibrous capsule from the cortex of the kidney to the perinephritic fat (Fig 322) or (*b*) by contiguity of inferted tissues (Fig 323) For this reason our prognosis was guarded and the possibility of further operative interference—*i e* nephrectomy—explained

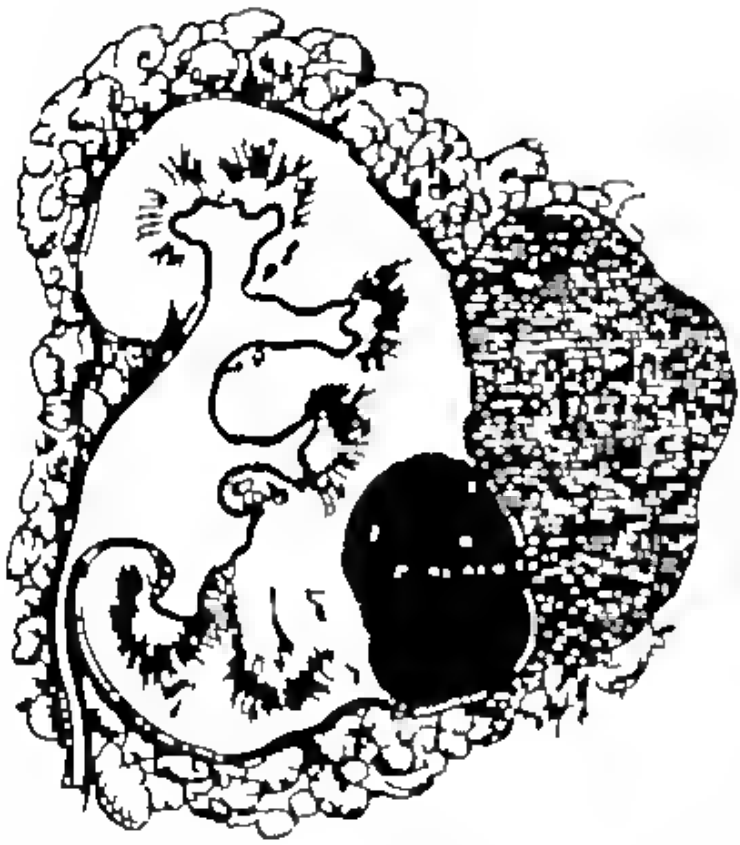

Fig. 323.—Conditions as found in Case I The multiple abscesses in the cortex of the kidney were undoubtedly the primary area of localization of the organisms, the perinephritic abscess being secondary As was stated in the discussion of this case, primary localization in the perinephritic tissues is not uncommon

to the relatives of the patient. That this was a wise precaution was demonstrated by the further course of the case The urinary findings continued to be negative but the fever persisted (Fig 321) in spite of ample provision for drainage. The white blood count and pulse remained correspondingly high.

My suspicion that a focus in the cortex of the kidney was responsible for the persistence of the symptoms was confirmed

incision was made on the right side such as one employs in nephrectomy Upon dividing the lumbar fascia a very thin greenish-yellow pus escaped in large quantities. The pus was very tenacious and widely distributed in the tissues around the kidney even up to the dome of the diaphragm, which explained the upward displacement of the latter as seen in the radiograph. The kidney itself did not seem enlarged, and further exploration

Fig. 122.—Relation of lymphatics of cortex of kidney to those of perinephritic fat. These penetrate the true capsule and permit of infection being carried from the kidney proper to perinephritic tissues.

was deemed inadvisable owing to the many dense adhesions. Drainage was provided for and the incision in the abdominal parietes closed Cultures from the pus showed a pure growth of Staphylococcus aureus, thus confirming our preoperative diagnosis of a perinephritic infection secondary to the boils on the neck.

Experience in similar cases had taught us that very fre

separate furuncles. Excision being deemed inadvisable, a nephrectomy was performed.

The appearance of the removed kidney on section was a very peculiar one (Fig. 324) With the exception of the involved area there were no naked-eye changes. The pelvis appeared normal, hence the absence of urinary and of cystoscopic findings. At the lower pole (Fig 324) was a mass formed by a large number of foci of suppuration, closely grouped and projecting considerably above the level of the capsule. We were evidently dealing with a hematogenous infection of the cortex which had extended into the fatty capsule (Figs. 322 323) and from here to the subphrenic (extraperitoneal) space.

The convalescence was uneventful and the patient was discharged from the hospital about six weeks after admission, and as you can judge from his appearance today (one year later) has remained perfectly well.

Comments.—This is unquestionably an example of a hematogenous infection of the kidney cortex with secondary involvement of the adjacent retroperitoneal tissues. The occurrence of such a metastatic localization is rather rare when one takes into consideration the frequency of suppurative lesions in the skin such as our patient had. Secondary hematogenous foci are found either in the kidney alone, with or without extension to the perinephritic tissues, or a metastasis may occur directly into the perinephritic fat, i. e. independent of any primary focus in the kidney

CASE II. HYPERACUTE EXACERBATION OF A CHRONIC PYELITIS

The second patient illustrates how a pyelitis of the puerperium may remain latent for a number of years, and then suddenly flare up in a hyperacute manner and give rise to the clinical picture of renal infection of the most severe type. In the interval this patient had recurrent symptoms which were diagnosed as gall-stones.

She was first seen in consultation about four months ago at her home some distance from Chicago She was the mother of 4 children, 2 of whom are living The youngest was four years

when we performed the second operation a week later The wound was reopened and the greatly thickened fatty capsule found riddled with small collections of thick pus. The abscess which had been drained at the first operation had evidently been located in the loose cellular tissue between the diaphragm and the kidney thus constituting one of the varieties of subphrenic abscess of extraperitoneal origin. The displacement upward of

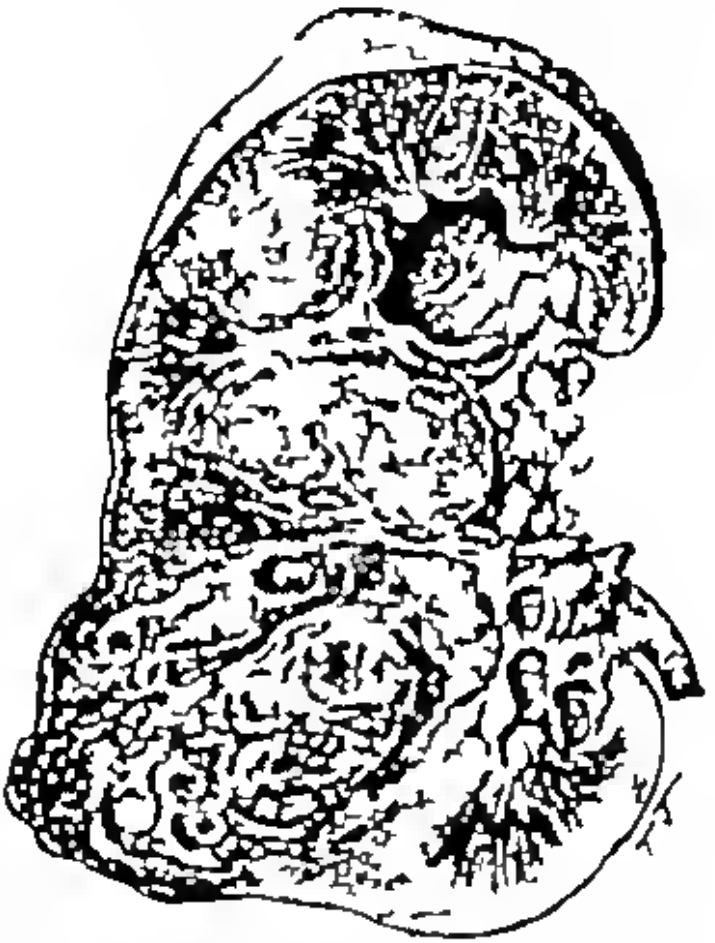

Fig 324.—Appearance of kidney from Case I after removal. Note the multiple abscesses at lower pole forming conglomerate mass which caused projection outward of the true capsule.

the right half of the diaphragm as seen in the radiograph was of great assistance in making the diagnosis of perinephritic abscess.

The kidney was exposed and an elevation about the size of a hazelnut seen near the lower pole (Fig 324) On the surface of this nodule there were about a dozen small purulent foci The entire mass presented the appearance of a typical carbuncle as so often seen on the neck or buttocks, i conglomeration of

of age. Her present trouble began shortly after the birth of this child in the form of attacks of pain in the right upper quadrant of the abdomen, which radiated toward the kidney region of the corresponding side. These attacks were diagnosed as being due to cholelithiasis. She had never been jaundiced or had chills or local evidences of gall-bladder infection. Each attack lasted about one week. About five months before my first examination she had an attack of what was diagnosed as cystitis, lasting five or six days.

Her present trouble had begun two weeks before being seen by me. Her physicians when I saw her in consultation had found a mass in the right upper quadrant apparently in the region of the kidney which was quite tender Her temperature, which was 100° F at the onset, later ranged between 99° F in the morning and 102.8° F in the evening Toward the latter part of the second week there had been a sudden rise to 105° F This temperature persisted without chills or any localizing signs referable to the kidney for four days. Upon the evening when I first saw her the temperature (Fig 325) had risen to 106.8° F (rectal) She seemed extremely ill and her lips were slightly cyanotic. On palpation of the abdomen one could feel a mass about the size of two adult fists in the region of the right kidney This enlargement was quite tender A diagnosis was made of acute infection of the kidney and transfer to this hospital advised.

Cystoscopic examination soon after admission revealed a much reddened and swollen trigone of the bladder The left ureteral orifice was normal. The right ureteral orifice was prominent and red and the bladder mucosa in its immediate vicinity was also edematous and red. Clear urine of a normal character escaped through the left ureteral catheter showing excellent functional capacity of this left kidney It was impossible to catheterize the right kidney but flakes of pus could be seen to escape from the orifice of the ureter on this side. *x* Ray examination was negative except that it revealed a rather large right kidney shadow A diagnosis of acute pyelitis was made and non-operative treatment instituted

The persistence of the high fever (Fig 325) necessitated a

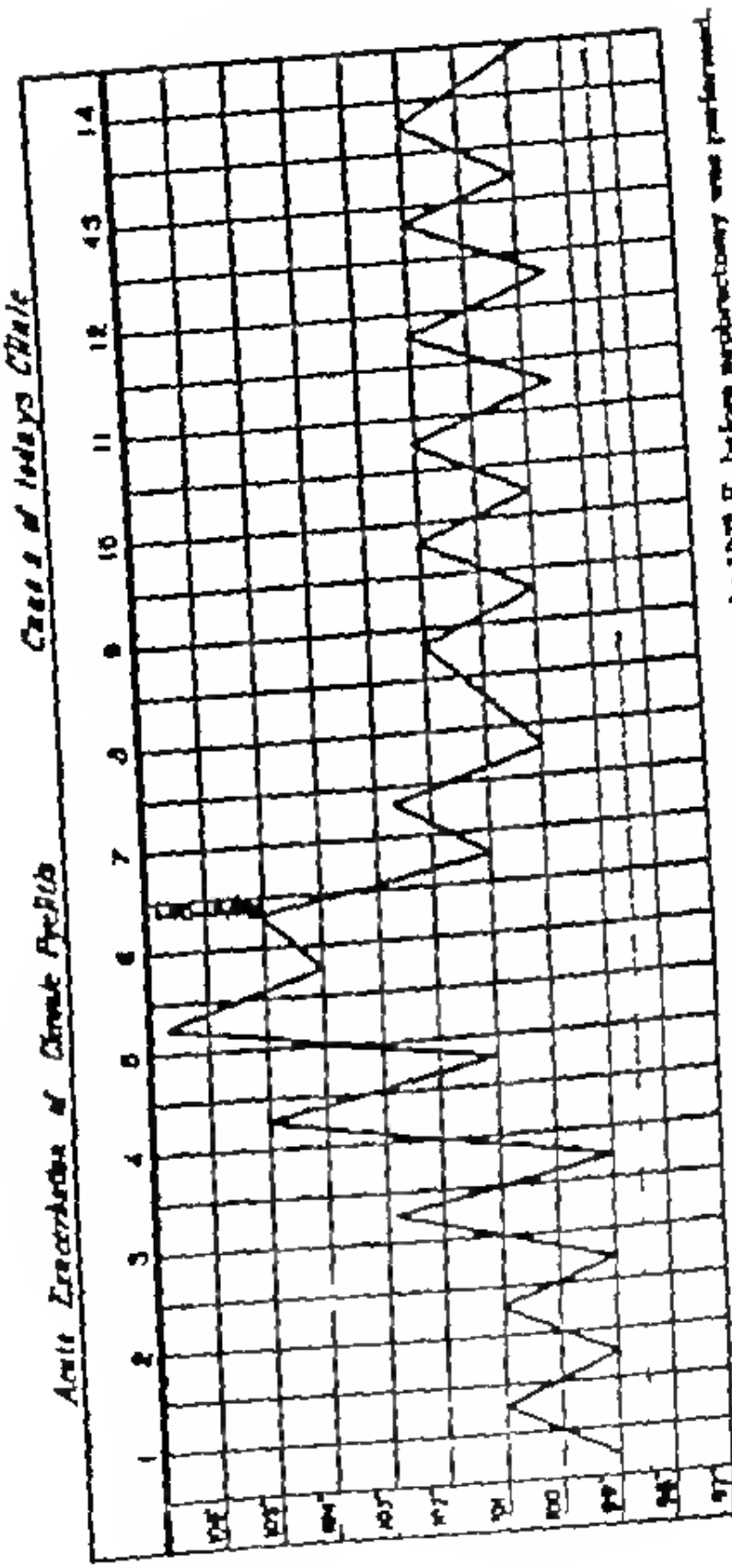

Fig. 111.—Temperature chart from Case 11 showing gradual rise to acuity 104° F. before nephrectomy was performed.

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The persistence of the high fever (Fig 325) necessitated a

change to operative treatment. The right kidney was exposed and the perinephritic tissues found extremely edematous. The kidney itself was greatly enlarged and intensely hyperemic, and the ureter and pelvis much thickened. On the surface of the kidney were innumerable red, punctate, hemorrhagic areas,

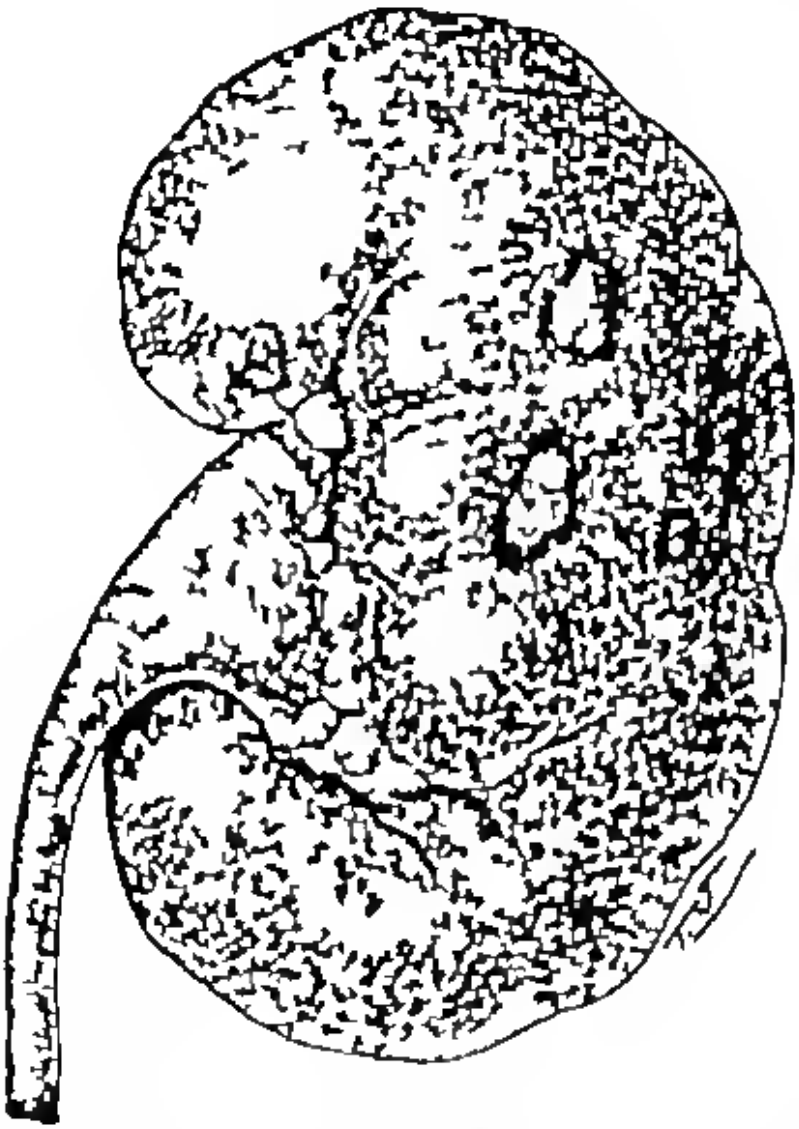

Fig 326.—Appearance of surface of kidney from Case II showing innumerable hemorrhagic foci of infection and few punctate and slightly larger areas of suppuration.

and also a number of pus foci, both of these varying in size from a pin-head to a millet seed each pus focus surrounded by an intensely hemorrhagic zone (Fig 326) On account of the evident presence of a diffuse infection of the kidney parenchyma nephrectomy was deemed indicated. This was carried out, and

the justification of this procedure is shown by the appearance of the exterior and a sectional view of the removed kidney (Figs. 326, 327) The pelvis also presented a large number of punctate hemorrhagic areas. The wall of the pelvis was greatly thickened and the ureter itself showed the typical thickened

Fig. 327.—Sectional view of kidney from Case II. Not punctate submucous hemorrhages scattered over renal pelvis, and the typical "streaks of suppuration extending from medulla into cortex as seen at lower pole of kidney

wall and dilated lumen (Fig 328) which has been recently described by Braasch Examination of the kidney parenchyma on section revealed a number of yellowish streaks (Fig 327) extending from the apex of the papillæ out toward the cortex, also several small, circumscribed areas of suppuration. The

Braasch Jour Amer Med Assoc vol 73 p. 731, Sept. 6, 1919

wide-spread infection of the kidney parenchyma was confirmed later by microscopic examination. On the surface of the pelvic mucosa was a thick purulent exudate. Cultures from the renal pelvis and from the foci of suppuration on the surface of the kidney revealed the presence of the Staphylococcus aureus in pure culture.

Aside from a rather diffuse infection of the soft tissues along the line of incision, which required reopening of the wound, the patient made an uneventful recovery and has remained perfectly well for the past four months following operation.

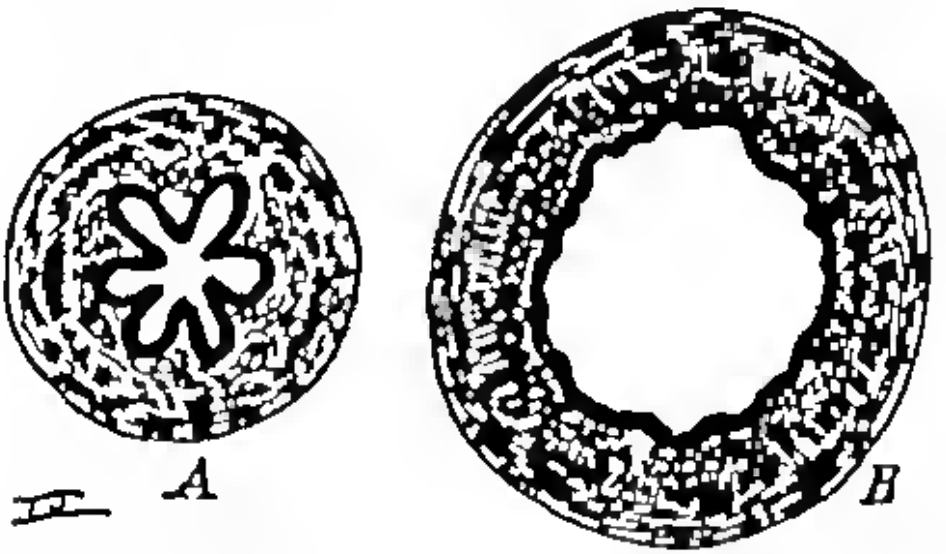

Fig. 328.—Cross-section of normal ureter (*A*) as compared with that of the ureter (*B*) of Case II showing in diagrammatic manner the typical inflammatory dilatation of the ureter.

Comments.—There are a number of most interesting features in this case: first, the appearance of the initial symptoms during her puerperium four years before the onset of the present rather fulminant symptoms. The diagnosis of gall-stones, made because of the recurrent attacks of pain in the right upper abdomen, is a mistake which is quite common. It is due to the fact that the average clinician does not think of the similarity in the clinical syndrome presented by infection of the biliary tract and that due to similar condition in the kidney. The symptoms of ureteral colic so frequently found in cases of acute or chronic renal infection resemble very closely those due to cholecystitis *with or without calculi*. The *latency of the symptoms* as seen

in this patient is due to the fact that many cases of chronic pyelitis harbor organisms for years without giving rise to symptoms until for some reason or other the virulence of the bacteria is suddenly increased or there is some obstruction. Not infrequently as in this case, renal infection may present the clinical symptoms of a bladder irritation in the form of increased frequency or painful urination. Had a thorough urologic examination been made at the time when the symptoms of cystitis and, later those of pyelitis presented themselves, involvement of the kidney parenchyma to such an extent as was found today might have been prevented. I shall speak in a later lecture of what I mean by a thorough urologic examination.

When the patient was first seen by me it was impossible before operation to distinguish as to the extent of involvement of the kidney parenchyma, as it is advisable to avoid a thorough urologic examination during the acute stage of a pyelitis. I advised a trial of expectant treatment, *i. e.* giving perhaps large quantities of water and urinary antiseptics, until the acute symptoms had subsided. On account of the extremely high temperatures in this case, and their persistence, operative interference rather than pelvic lavage became necessary and was amply justified by the improvement in the patient's condition which followed.

It is a question in my mind whether or not it is advisable to attempt a closure of the nephrectomy incision in these cases of very severe infection. I have recently observed that it is impossible to secure much union in spite of ample provision for drainage in all portions of the incision. I am strongly tempted in future cases not to close the wound, *i. e.* to allow healing by second intention to occur because in 2 of these cases I was obliged to reopen the entire incision, all the tissues being found riddled with areas of suppuration.

The pathologic changes found in the kidney were typical of an acute non-tuberculous infection. The great thickening of the wall of the renal pelvis and of the ureter and the inflammatory dilatation of the latter are pathologic changes to which I do not believe the average surgeon has paid sufficient atten-

tion. This explains why at times it is impossible to secure favorable results from repeated pelvic lavage. The results of this inflammatory dilatation are quite analogous to the changes found in the gall-bladder in cases of long-standing infection. The rigidity of the ureteral wall and the dilatation of its lumen favor stagnation through the inability of the musculature to contract upon the column of urine which is passing through it, and a condition results which is analogous to that found in cases of chronic cholecystitis, *i. e.*, a rigid wall incapable of expelling its contents.

You will more clearly understand the entire question of renal infection if I call your attention to the most salient points of the pathology of renal infection in the present lecture, and then in subsequent ones take up some of the various clinical pictures under which each appears and their treatment.

CAUSATIVE ORGANISMS AND ROUTES OF INVASION

The organisms most frequently responsible for renal infection are the colon bacillus and the group usually spoken of as the ordinary pyogenic organisms. The colon bacillus is found in 90 per cent. of the cases either alone or associated with one or more of the ordinary pyogenic groups of organisms. Of the latter those which occur most frequently are the Staphylococcus aureus and albus, these constituting practically all the remaining 10 per cent. of the cases. In a certain proportion of cases of renal tuberculosis the tubercle bacilli are found associated with either the colon bacillus or with one of the pyogenic organisms. I have called attention to these cases of mixed infection in several of my recent papers on the subject of tuberculosis of the kidney.

There are three general routes by which organisms enter the kidney, renal pelvis, or ureter. These are (*a*) the hematogenous route, *i. e.* through the blood-vessels of these respective structures (*b*) by way of the lymphatics (*c*) along the lumen of the ureter. In the first or hematogenous route the organisms are carried to the kidney from a primary focus in the teeth, tonsils,

bones, etc. The first place of lodgment in the kidney proper is in the glomeruli, from which the infection extends along the tubules (Fig. 329) to the apices of the pyramids, with secondary invasion of the pelvis of the kidney Hunner has recently di-

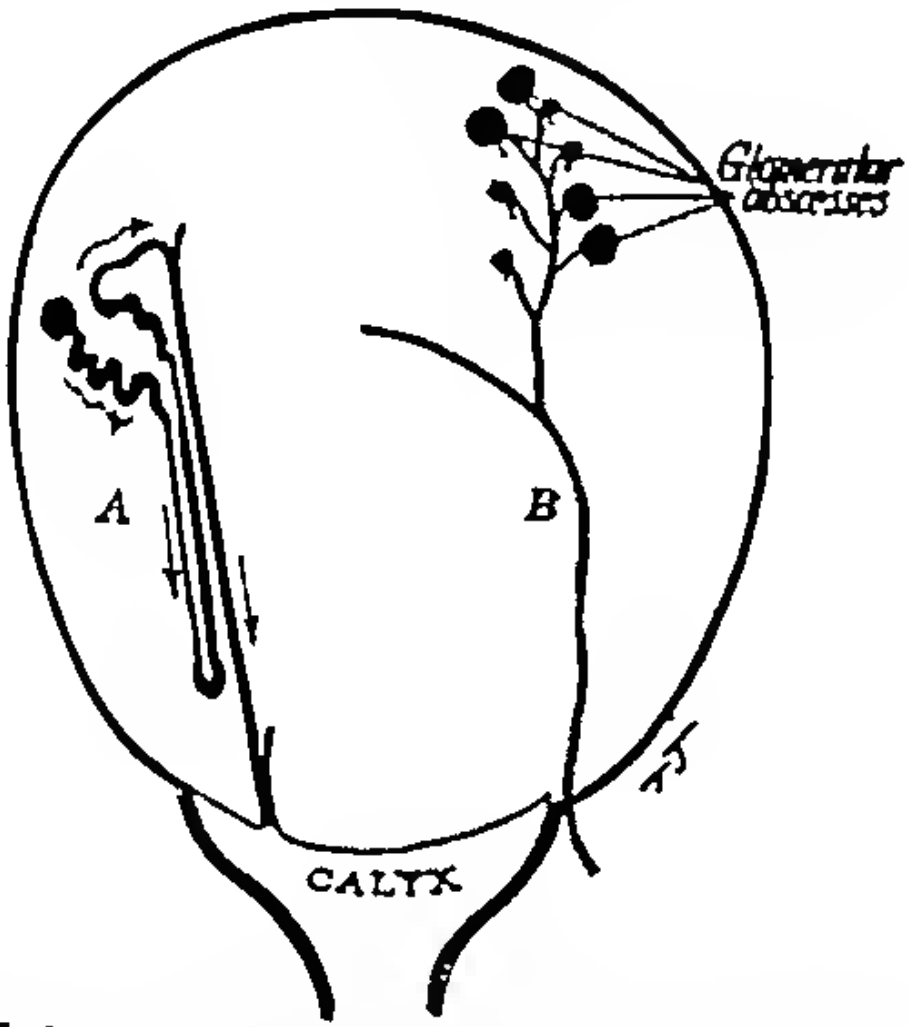

Fig. 329.—Diagrammatic representation of mode of localization of hematogenous infections of the kidney. *A* Primary localization in glomerular network with extension of infection downward through tubular system into apex of pyramid as indicated by arrows. This route explains how infection of one of the minor cycles takes place, and from here the entire renal pelvis is involved. *B* Primary localization of organisms in glomeruli of kidney when carried by the hematogenous route with resultant glomerular abscesses.

rected attention to the fact that the hematogenous route thus explains many of the cases of ureteritis in the female, especially those in which a stricture is found. It is easy to understand how a focus of infection in any portion of the body can be followed through metastasis by infection of one or both kidneys. In-

volvement of the perinephritic tissues, as I have explained in connection with the first case of this clinic, may occur either primarily that is, the organisms may be carried directly to the perinephritic tissues through the blood-stream, or the fatty capsule may be involved secondarily through extension from the primary cortical focus (Figs. 322, 323)

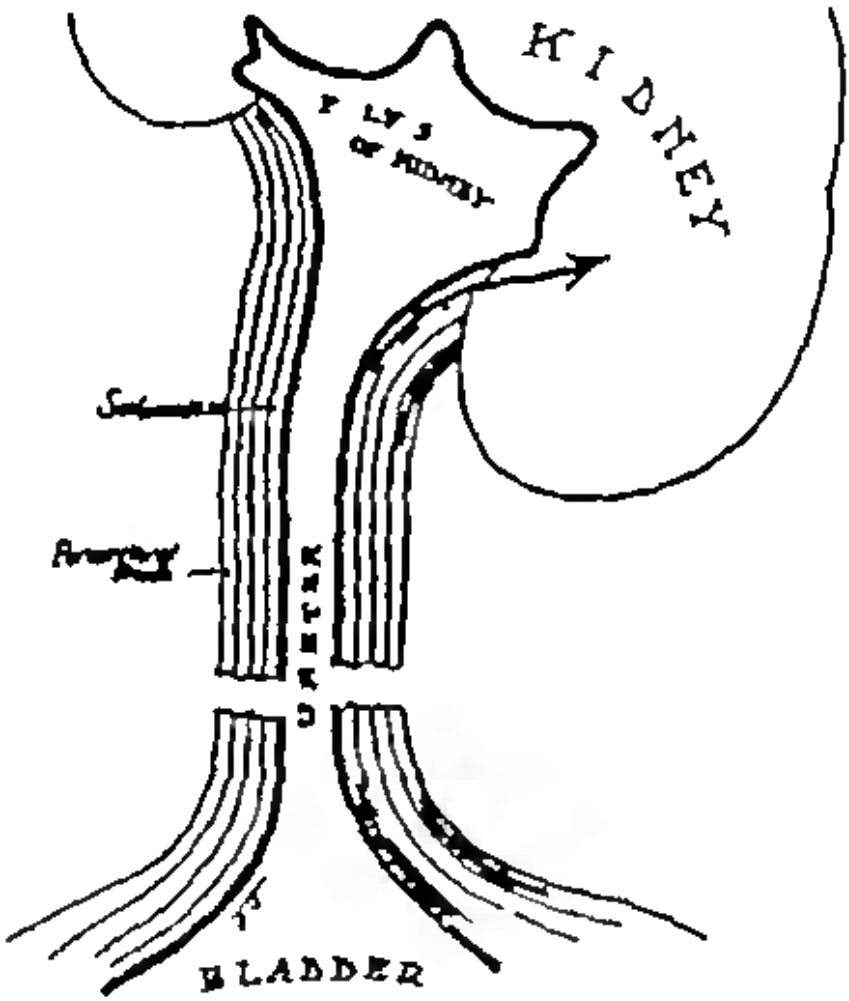

Fig 130.—Diagrammatic representation of mode of spread of infection along submucous and peri-arterial coat of ureter from bladder to kidney

The second or lymphogenous route, although not fully accepted by many writers, is, I believe, destined to be of great value as a working hypothesis at least upon which to explain many of the cases of renal infection which do not present the characteristics of hematogenous invasion.

The lymphogenous route may be divided into two subgroups (*a*) those in which the infection is carried upward by the

ymphatics of the ureter from the bladder prostate, seminal esicles, and internal genitalia (Fig 331) (*b*) those in which hrough communication of the lymphatics of the colon and the idney (Fig. 330) as first demonstrated by Franke, to permit the rganisms to be carried from the alimentary to the urinary tract ithout first passing through the blood-stream.

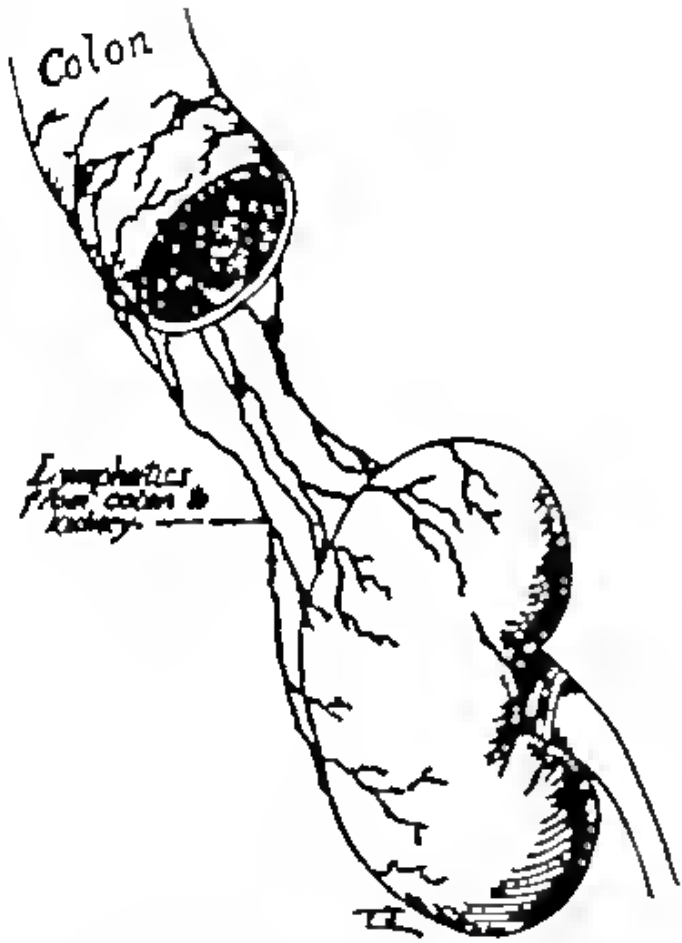

Fig. 331.—Diagrammatic representation of lymphatic communication of colon and kidney (After Franke.)

Franke was the first to call attention to another route by which organisms could reach the kidney by way of the lymphatics. He was able to demonstrate the relation between the lymphatics of the colon and those of the right kidney (Fig 331) His conclusion was that organisms can travel by this route without entering the blood-stream.

The third or urogenous route assumes that the organisms travel along the mucous membrane of the ureter or multiply in

the stagnant column of urine, and thus reach the kidney It is difficult to understand how organisms should be able to migrate upward in a direction opposite to the secretory current, except when a more or less complete narrowing of the lumen of the ureter exists. It is generally accepted that any form of obstruction, whether intrinsic or extrinsic, of the urethra, bladder or of the ureter or kidney pelvis itself, favors the spread of an infection of the upper urinary tract. The principal causes of such obstruction in the lower urinary tract are stricture of the urethra, hypertrophied prostate, bladder calculi, etc. Those of the upper urinary tract are (*a*) extrinsic—spiral twists, kinks, inflammatory compression of the ureter accessory renal vessels, or tumors which decrease the lumen of the ureter (*b*) intrinsic causes, such as congenital and acquired strictures of the ureter calculi, and benign and malignant tumors of the ureter or renal pelvis.

PATHOLOGIC CHANGES

Strictly speaking, involvement of the entire upper urinary tract is almost always present in every case of renal infection, hence it is more correct to speak of a ureteropyelonephritis than of infections of any one of the three component parts of the upper urinary tract, *i e* of a ureteritis, a pyelitis, or of a pyelonephritis.

Clinically however the pathologic changes may predominate either in the ureter in the renal pelvis, or in the parenchyma of the kidney itself A pyelitis or ureteritis are rarely present without some microscopic involvement of the kidney parenchyma, and yet the clinical symptoms of the pyelitis or ureteritis may predominate. On the other hand, involvement of the renal parenchyma may completely overshadow that of the pelvis, both from a pathologic and clinical standpoint, as in our second case.

In the early stages of a hematogenous infection one observes on the surface of the kidney many minute foci of suppuration, each surrounded by an area of intense hyperemia. The cortex alone may at first be the chief seat of the pathologic changes, but as the infection progresses involvement of the entire parenchyma

so completely changes the pathologic picture that it is impossible in the majority of cases at a later stage to distinguish as to whether the primary mode of invasion was hematogenous or ascending that is from the lower urinary tract. The typical appearance of an ascending infection may be that shown in the specimen obtained from our second case (Figs. 326, 327) The streak-like areas radiating from the apices of the pyramids toward the cortex are supposed to be quite characteristic of an ascending infection, but, as I have said, where there is a more advanced involvement it is impossible to distinguish as to whether the primary mode of invasion was ascending or descending that is, hematogenous. As the infection progresses in the parenchyma, necrosis of the kidney tissue occurs with the formation of cavities at the expense of the parenchyma until the entire kidney is converted into a series of pockets filled with pus and separated from each other by septa. This terminal stage is the condition so familiar to all of you as pyonephrosis.

If the obstruction at the ureteropelvic junction or in the ureter occurs at a relatively early stage the parenchyma, instead of being broken down, becomes compressed as a result of a dilatation of the renal pelvis and its calices. This sequelæ of infection is known as infected hydro- or more properly speaking ureteronephrosis. Pyelography is an excellent way of distinguishing between hydronephrosis and pyonephrosis. In the cases in which pathologic changes predominate in the renal pelvis, infiltration of its walls and those of the ureter are very important from a clinical standpoint, as I have already said in connection with the second case of today's clinic. This thickening of the walls prevents the renal pelvis and ureter from expelling their contents, and not only favors infection, but greatly prolongs it, hence it plays an important part in explaining the recurrences in cases of pyelitis, especially where some form of obstruction in either the lower or upper urinary tract exists.

There are two forms of pyelitis which have not attracted sufficient attention, namely pyelitis cystica and granulosa. In the former condition one notes a cystic appearance of the entire mucosa of the renal pelvis and this may extend downward so as

to involve the lining membrane of the entire ureter In the second form of pyelitis the mucosa is covered by granulation tissue which may bleed and give rise to such severe hematuria as to simulate in every respect that due to a neoplasm.

From a clinical standpoint it is important to remember that any form of pathologic change may accompany calculi either in the ureter proper or pelvis of the kidney or in its parenchyma. The exact relation of renal infection to calculus formation is not clearly understood. We know however that a recurrence is not infrequent after removal of calculi in cases where infection coexists. Whether the formation of calculi is primary or secondary has not been absolutely determined. There is one striking feature about the pathologic changes in infection of the upper urinary tract that is true of infection in other parts of the body namely that much depends upon the virulence of the particular strain of organisms and upon the resistance of the host.

In our next clinic we will discuss two clinical types of renal infection usually referred to as the pyelitis of pregnancy and the puerperium.

CLINIC OF DR. FREDERICK G DYAS

COOK COUNTY HOSPITAL

COMPOUND FRACTURE OF FEMUR IN A CHILD

Summary Difficulty in handling compound fractures of the femur in children. Method employed in present case. Value of open-air method—continuous use of antiseptic solutions devitalizes tissues and prevents healing.

THIS patient a girl of twelve years while playing in the street was run over by a truck. She was brought to the hospital with a compound fracture of the right femur badly contaminated with street dirt.

This type of fracture presents great difficulty in the way of treatment, both from the standpoint of reduction and fixation and of treatment of the infected wound. She was immediately given a prophylactic dose of antitetanic serum A vertical Buck's extension was applied and the largest possible amount of weight attached with the idea of extending the muscles and bringing about reduction and alinement of the fragments. In our experience the great difficulty with the use of the vertical extension has been the tendency of the fragments to sag posteriorly This may be counteracted to a very large extent by flexing the leg upon the thigh to about a right angle. It is always possible to do this when a sufficient amount of uninjured skin is left below the wound in the soft tissues of the thigh. However in those cases in which extension must be applied to the skin of the leg rather than of the thigh it is impossible to flex the knee. In this case the wound was treated by débridement, and for a short time by Carrel-Dakin solution. Great care was exercised to protect the surrounding tissues from the irritating action of the solution by the use of vaselin gauze.

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thelium, obviating any necessity for skin-grafting There is a firm union of the fragments of the femur with practically no displacement or shortening It is believed that this method will reduce the treatment of compound fractures of the femur in children to the very simplest measures possible, bringing about the best results in the shortest space of time. It is to be added that in addition to the local treatment the patient was given forced feeding and, so far as possible, out-door treatment.

In this connection it is interesting to bear in mind that the principle of desiccation or dehydration of tissues for their preservation was recognized by the Egyptians in the preservation of their dead. It is well known that moisture devitalizes tissues, as illustrated by the edema and desquamation of the skin of women who have had their hands in soapsuds for the better part of the day The Indians in their crude manner preserved meat by exposing it to the sun and wind, high up in the branches of trees. Its juice drained out and the sun and wind dried the tissues. This principle is equally applicable to the treatment of infected wounds. It is perfectly true that in many cases dressings are necessary for economic reasons in order that the patient may continue about his work, but a subjection of the tissues to continuous immersion in either antiseptic solutions or dressings saturated with pus devitalizes them and prevents healing Furthermore, the exposure of pathogenic organisms to the sun and air brings about a lowering of their virulence. This method is used in the laboratory for the attenuation of bacteria. It is, therefore, incumbent upon us to dispense with wet dressings at the earliest possible time. This advance in the treatment of wounds is comparable to the advance made in the treatment of fractures in proximity to joints, namely the subjection to early passive motion and mobilization.

As soon as it was possible to discontinue the wet dressings the wound was treated by exposing it completely to the air. A large piece of mosquito netting was draped over the extension rope and allowed to hang down over the limb. This gave the patient great comfort, as she was spared the annoyance caused by daily dressings, in which the gauze pulls off the new granulations which become entangled in its meshes. Further no new

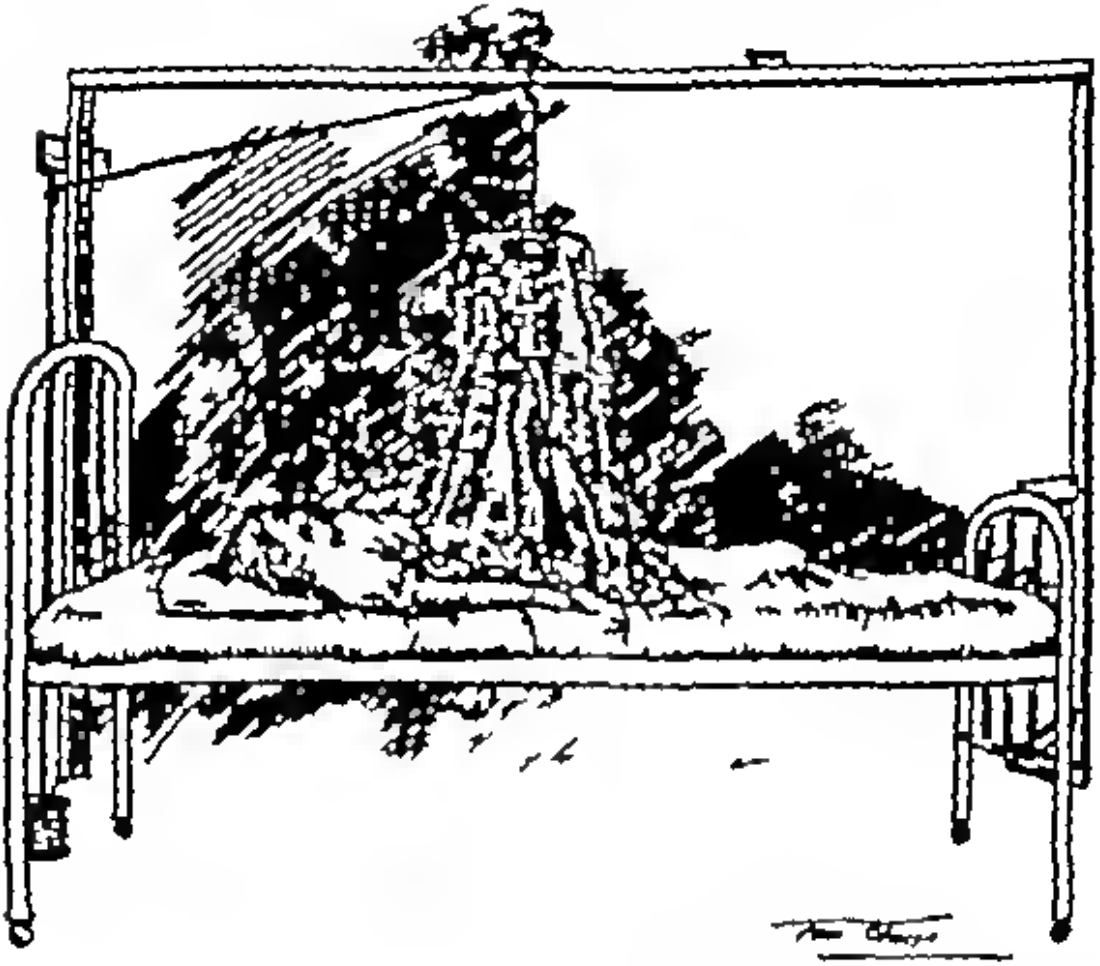

Fig. 332.—Compound fracture of femur with badly infected wound treated by the open method and vertical extension.

bleeding surface was left for the absorption of toxic material. For several days a large amount of desiccated serum and pus piled up on the surface of the wound. This was dissolved by the application of boric acid dressings for a period of twenty-four hours, when the crusts came off easily in large plaques and the open treatment was again resumed.

The denuded area is now well covered by scar tissue and epi-

CHOLELITHIASIS WITH BILIARY FISTULA DISCHARGING AT *THE UMBILICUS*

Summary Patient presenting discharging sinus at the umbilicus accompanied by attacks of gall-stone colic. Elongated gall-bladder adherent at fundus to under surface of umbilicus found at operation. Explanation of this phenomenon.

THIS woman is forty-four years of age. She comes to the hospital complaining of a continuous discharge of yellowish material from an opening in the region of the umbilicus. Five years ago she had a laparotomy for the removal of a tubo-ovarian abscess and shortening of the round ligaments. Her convalescence was normal and she was in good health until three years ago when she began to have attacks of pain in the upper right quadrant of the abdomen accompanied by nausea and vomiting and great tenderness on pressure in the region of the gall-bladder She was not jaundiced at any time and the stools were not clay colored. She is unable to say whether or not she had any elevation of temperature or leukocytosis. These attacks of pain have come on without any regular periodicity and without great increase in severity although in each attack it has been necessary for the attending physician to give a hypodermic of morphin. Aside from this her history is unimportant.

The clinical diagnosis before operation was fecal fistula and cholelithiasis. An incision is made about 1 inch away from the fistula into the abdominal cavity in order not to injure the bowel in case the diagnosis of fecal fistula is correct. On introducing the finger through the incision no bowel can be found adherent to the under surface of the umbilicus, but a tubular structure with a very thick wall is found extending upward to the under surface of the liver where it is continuous with the gall-bladder Upon palpation of this structure a hard mass, of the consistency of a stone is found about its middle. In order to more thoroughly explore this structure it is necessary to enlarge the incision

ing acute inflammation it may become distended to many times its normal size, may extend in its distended condition to organs which are normally far remote from it. Under these conditions, its peritoneal covering being inflamed, it may become adherent to a loop of bowel or to the stomach, and during subsequent attacks the infected material of the gall-bladder including

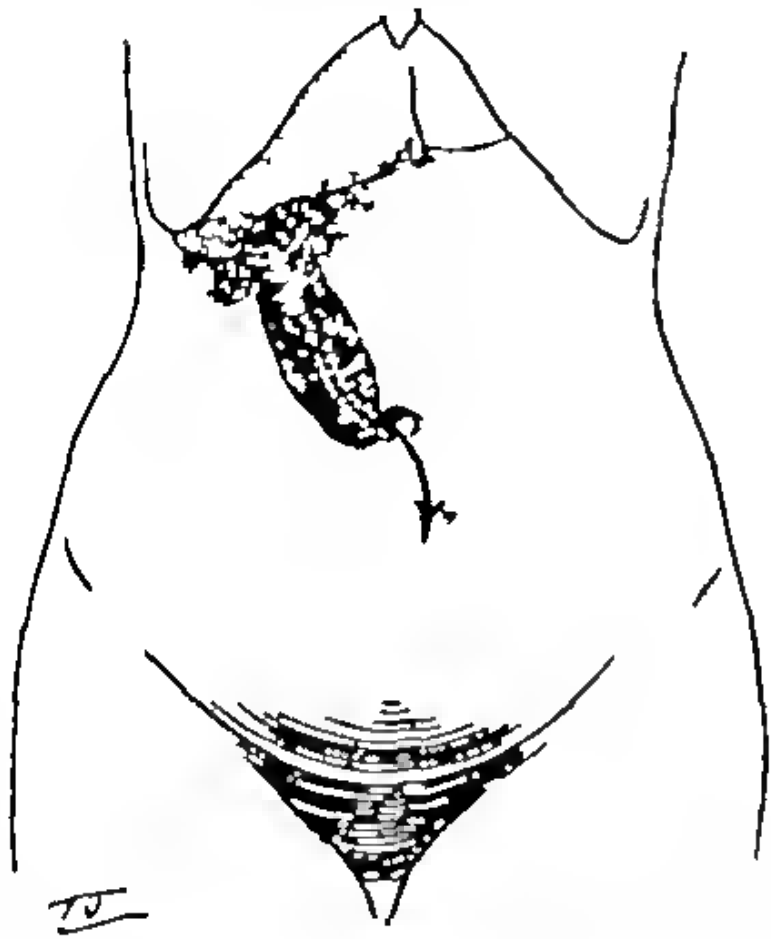

Fig. 343.—Enlarged and thickened gall-bladder attached by its fundus to the anterior abdominal wall and discharging its contents through fistula close to the umbilicus. Cholecystectomy with recovery.

calculi, may penetrate by ulceration into the organs to which it is attached. Biliary calculi have been found in almost every hollow viscus in the abdomen, but more commonly in the small bowel, ascending or transverse colon, or stomach. The escape of infective material from the gall-bladder into these organs frequently brings about a spontaneous cure, representing upon the part of nature the operation which is occasionally done in ob-

in an upward direction, as is done for exposure of the gall-bladder and biliary tracts. I am tracing this structure upward. It is found to be a very much elongated and thickened gall-bladder, which is about the size of a banana, adherent at the fundus to the under surface of the umbilicus. The fundus is now freed, and upon its removal a mucoid substance can be pressed out. Upon freeing it further a constriction is found about its middle, which when opened discloses the presence of gall-stones. The gall-bladder is now freed from the under surface of the liver and the cystic duct and artery isolated. These are tied with double catgut sutures and ligatured to prevent their slipping. In this connection I believe that if the dissection is carried down from above to the cystic duct, and then the cystic duct and artery lifted up on the finger there is very little danger if any of including the common or hepatic ducts in the ligatures. The danger comes, I believe, in making the dissection from the cystic duct in a retrograde manner toward the fundus of the gall-bladder. The ligature is now firmly tied and the cystic duct is clamped in order that when it is amputated the contents of the gall-bladder may not escape into the peritoneal cavity. The bleeding on the under surface of the liver is controlled by pressure with hot sponges and the stump of the cystic duct is allowed to drop back into the peritoneal cavity. When in doubt as to the danger of including a portion of the hepatic or common duct in the ligature, it is much better to leave a considerable part of the cystic duct, as this structure will not lead to any further pathology if no stones are left in. In other words, it is better not to try to remove the last fraction of the cystic duct than to endanger either the hepatic or common ducts. The abdomen is closed with drainage-tubes extending down to the liver bed and the stump of the cystic duct.

While it is not very uncommon to find biliary calculi in other hollow organs contiguous to the gall-bladder it is a very rare pathologic phenomenon to find an elongated gall-bladder attached to the parietal peritoneum discharging upon the surface of the skin. The gall-bladder by reason of the mobility conferred upon it by its attachments and by the fact that due

TETANUS FOLLOWING A CONTUSED AND LACERATED WOUND OF LEG RECOVERY

I WISH to present to you the history of a patient who has just recovered from a tetanus infection which followed an apparently malignificant wound of the leg

The patient, a boy of nine years was admitted to the hospital May 23 1920 suffering from a contused and lacerated wound of the left leg The injury occurred three weeks before admission, but caused no anxiety on the part of the parents until about May 20th, when it was noticed that the patient could not fully open his mouth, that he was very irritable, and had no appetite. The inability to open the mouth increased until only a space of about ½ inch could be opened between the incisor teeth.

Upon admission to the hospital it was noticed that the boy rested tranquilly until disturbed by noises or by attempts at examination, when the muscles would suddenly contract, producing a moderate opisthotonos and causing great pain. It was possible for the patient to open the lips but the jaws remained almost fixed, and any attempt to force the jaws open resulted in excessive pain and increased convulsions. There was rigidity of the neck muscles. On raising the child from the bed the whole body assumed a spasm of the tetanic variety and most exaggerated in the flexor muscles. All the tendon reflexes were present and exaggerated A diagnosis was made of low-grade tetanus infection resulting from street dirt being ground into the leg wound

The patient was treated by the administration of 5000 units of antitetanic serum intramuscularly on May 24th. The following day 15,000 units were given intramuscularly the next day 10,000 intravenously and on the fourth day 10,000 intravenously Following the fourth injection the patient could open the mouth wider His general condition was better Two days later 10,000 units were injected intramuscularly On

structive lesions of the common duct of forming an artificial channel between the fundus of the gall-bladder and the duodenum a cholecystenterostomy Ordinarily once this fistulous communication is established between the fundus of the gall-bladder and the lumen of the bowel, stones may be passed without any pain because of the large lumen of the bowel. This results in spontaneous symptomatic cure. In other cases where the calculi are large in size and numerous they may reach a still larger size within the lumen of the bowel and produce an intestinal obstruction by occlusion of the lumen, or they may ulcerate through into the free peritoneal cavity exactly as they ulcerate through the wall of the gall-bladder into the wall of the bowel resulting in a septic peritonitis.

It is unfortunate that the *x* ray cannot give us definite information about the presence or location of biliary calculi except in a few cases. Under ordinary circumstances the calculi are not dense enough to cause a shadow when subjected to the *x* ray It is believed that in most of these cases subjected to operation it is better to remove the entire gall-bladder than to drain it, after separation from tissues to which it is adherent, because it is certain to give trouble in the future which will demand its removal.

After-history —The patient made an uneventful recovery and left the hospital at the end of two weeks. The presence of the biliary fistula was not considered in the diagnosis because during her stay in the hospital from the inadequate history obtained through an interpreter no bile or stones had appeared, and the further fact that she had had a laparotomy seemed to bear out the probability of its being a fecal fistula.

Fig 335—Tetanus. Tetanic spasm of skeletal muscles illustrating severe type of seizure.

May 31st there was a marked increase in the aperture between the jaws and the child showed a normal temperature. On June 12th he was discharged well as to the tetanus, but was ordered to return daily to have the leg dressed During the course of the infection the highest temperature was slightly above 100° F It did not exceed that at any time.

Fig 334.—Tetanus. Illustrating lockjaw and expression of terror Recovery

This case represents a mild tetanus infection. It is to be remembered that there may be all grades of virulence in tetanus infections, just as there may be in pus infections I had one case at Provident Hospital of a workman who fell from a scaffolding incurring lacerated wounds. He died within seventy two hours of an extremely virulent tetanus infection. These

CLINIC OF DR. ALLEN B KANAVEL

WESLEY MEMORIAL HOSPITAL

HEMATURIA

Summary: Demonstration of two cases, with analysis of the clinical picture presented by each. Necessity of thorough examination of every case of hematuria. Differential diagnosis of the causes of hematuria. Treatment of advanced carcinoma of the bladder

LET me present briefly two patients with hematuria.

CASE I.—This patient complains of hematuria and frequent urinations of burning on urination, of stopping of the stream during the act and of pain on the left side of the abdomen.

His trouble began in 1915 with the appearance of a small amount of blood in the urine, noticed once or twice a year These occurrences gradually became more frequent, until now he passes blood for a week or two at a time at intervals of three or four weeks. He has complained of dribbling for the past ten years and of burning on urination for the past year At present he urinates eight or ten times during the day and five or six times at night. The stream stops several times during the act of urination. He has no acute pain, but a feeling of fulness in the rectum and severe backaches accompanying the attacks of hematuria. He has had a "stitch in the back for thirty five years. He has never passed any gravel or small stones.

We have performed a suprapubic cystotomy upon this patient, and placed a tube in the bladder with a suction apparatus attached to it for draining off the urine. Though he is seventy two years of age he is in good physical condition, and has not lost weight to a noticeable degree. He has no complaints except those that I have mentioned

cases, fortunately are rare, the usual incubation period being from seventy two hours to one week. The prophylactic use of serum is to be relied upon much more than its use as a therapeutic agent after the disease is once fully established. However in those cases in which it is possible to relax the spasms, feed the patient, and keep up his strength for a sufficiently long space of time the force of the infection will wear itself out and the patient will recover General symptomatic treatment and nursing are of the very greatest importance when this fact is borne in mind.

kaline urine, with a specific gravity of 1 030 loaded with pus-cells, red blood-cells bacteria, and epithelial débris.

Both of these patients, you will observe, present a definite and important symptom—hematuria. I am drawing your attention to this subject because the presence of blood in the urine is a condition which demands serious consideration. A physician is not justified in giving only passing attention to such a symptom. It is not an obligation of the patient to prove that he has some serious condition producing hematuria it is your duty as a physician to determine immediately the origin and nature of the hemorrhage in the first place, because hematuria may indicate the presence of some serious pathologic condition which jeopardizes the patient's life, and in the second place because the transitory character of the symptoms at the outset may lead you into neglecting to make a diagnosis until the opportunity for successful intervention is past. Let us first ask ourselves what are the common sources of blood in the urine. We know for example, that bleeding from a varix in the pelvis of the kidney is not as common as hemorrhage from stone. We know that essential hematuria, so-called is uncommon as compared with hemorrhage from a tumor of the bladder In other words, I wish you to have a proper appreciation of the relative importance of the various causes of hemorrhage. You have perhaps seen few cases of hematuria, and if you go from this clinic simply with an outline of the causes of hematuria in your minds, you will approach your first cases with a wrong conception. You must realize that certain conditions are common and that others are very uncommon.

Of the pathologic conditions causing hematuria other than nephritis, the most common of all, the majority may be grouped under what we may call the "surgical conditions —stone, tumor and tuberculosis—in the order of their frequency Each of these conditions presents a serious outlook for the patient, each is amenable to surgical treatment if diagnosed early The presence of each should be carefully excluded before you permit the patient to leave your care.

CASE II.—This patient complains of hematuria, of a burning sensation on urination, of frequency of urination, of suprapubic pain and pain in the back, and of loss of strength.

The patient states that she had never been sick until nine weeks ago when the urinary symptoms mentioned came on very suddenly. She first noticed an attack of severe backache and abdominal pain while at church on Sunday morning. At noon of the same day she passed almost pure blood, which clotted very rapidly. During the afternoon and evening she had two similar attacks of pain during which, she says, bloody urine came in a gush and then stopped suddenly. On the following day she had two similar attacks. The bleeding then subsided somewhat until the following Friday or Saturday when it was again severe and accompanied by weakness and dizziness. The patient consulted a physician, who gave her some dark pills that colored the urine like bluing. After two weeks she consulted another physician, who kept her in bed for two weeks. For another week she was treated with irrigations of the bladder each one of which was followed by the instillation of black medicine. The hematuria became less after the end of the first week, and stopped entirely after the second week. The patient has not noticed any blood since.

Backache has been very severe with each discharge of blood. She describes the suprapubic pain as a feeling of pressure or constant fulness even when the bladder is empty. The burning has been present almost constantly since the onset of the trouble. At present she voids urine every few minutes during the day and gets up at least six or seven times at night. She has felt weak since the end of the first week. Pus in the urine was first noticed by the doctor five weeks after the onset of the trouble. The patient states that the urine has been thick and "nasty looking" for a long time. She believes it was too thick to pass readily. Beyond these facts the history contains nothing of which I wish to speak.

The patient is seventy two years of age and in excellent physical condition. The physical examination adds nothing bearing on the subject. Th urine examination shows an al-

cystitis, nevertheless, by analyzing the patient s history and by *making a careful examination, we can usually come* to a *definite* conclusion as to the nature of the pathologic condition present.

In tuberculosis the first symptom is commonly increased frequency of urination and burning on urination. Associated with this there may be a small amount of pus and microscopic blood in the urine. If you are alert you will make a careful examination of a catheterized specimen of urine for tubercle bacilli, and if you do not find any inject 20 minims of another catheterized specimen into a guinea-pig

Cystoscopic examination may already show tiny ulcerations about the orifice of the ureter and inflammation of the trigone. Submucosal petechial hemorrhages may appear at the bifurcation of the small vessels. Later tubercles may be found in the bladder mucosa, the ureteral orifices may gape, due to the development of fibrous tissue about them, and the latter process may result in the formation of ureteral stricture. If a culture of the urine from the affected side shows a secondary infection, such as a colon bacillus or an ordinary staphylococcus infection, you may say to yourself 'This inflammation and ulceration is due to a colon bacillus infection but do not forget that in the majority of cases ulceration of the bladder is due to tuberculosis.

In this connection I wish to call your attention to Crabtree s method of examining the urine for tubercle bacilli, described in *Surgery Gynecology and Obstetrics* February 1916 He showed that since the specific gravity of tubercle bacilli is considerably less than that of pus, and only slightly greater than that of urine if an infected urine is centrifuged by the ordinary method the sediment carried down will contain few if any organisms. If however the supernatant fluid remaining after the urine has been centrifuged for a few moments at slow speed is centrifuged for fifteen or twenty minutes at high speed, the second sediment should show tubercle bacilli in practically all cases suffering from renal tuberculosis. It is unnecessary to remind you that the urine should be obtained with a sterile

Of the conditions which we have just mentioned it is rather characteristic that the hemorrhage is of an intermittent type. Not uncommonly these patients have periods in which they are entirely free from symptoms perhaps they remain well for weeks or months. Later they have recurrence of the bleeding, and if the first physician has failed to make a diagnosis, perhaps they go to another physician, who follows the same careless method of treatment, gives some urotropin, and waits to see what will happen.

Eventually the tuberculosis, which at first was unilateral, involves the other kidney or the pyelonephritis, which developed about an infected stone, results in a generalized infection that makes operation a hazardous procedure, or the benign tumor of the bladder undergoes malignant degeneration, and the patient dies from an inoperable carcinoma—because the physician who first saw the case failed to make a diagnosis.

When we attempt to draw conclusions as to the origin of the hemorrhage in these cases we find that the amount and character of the bleeding is of great importance. Blood intimately mixed with urine and accompanied by renal epithelium speaks strongly for hemorrhage from the kidney itself. If the bleeding originates in the bladder the patient may pass a considerable amount of almost pure blood, with little admixture of urine. Under such conditions the patient may have a sudden and severe hemorrhage and become very weak and dizzy as this second patient did owing to the ease with which the blood escapes into the distensible bladder Symptoms of acute anemia are not uncommon following such hemorrhages, for the bleeding tends to recur when the bladder is washed out or emptied spontaneously

In addition to hematuria in these cases there is commonly a pyuria, due to irritation and secondary infection of the kidney and bladder If a stone, a tumor growth, or an enlarged prostate partially blocks the urethral opening there will be a certain amount of residual urine constantly present which still further favors the development of infection.

Although these three conditions—stone tumor and tuberculosis—commonly present the same symptoms, hematuria and

Of the tumors which occur in the kidney the most common, by all odds, is hypernephroma. The less common tumors include sarcoma, carcinoma, embryonic tumors, cysts, and the benign growths. It is not common with tumors to find blood in the urine early in the course of the disease, although it will appear earlier in sarcoma and carcinoma than in hypernephroma, since the latter tends to develop first in the cortex of the kidney and only causes hemorrhage secondarily by congestion of the blood-vessels, rupture of varicose vessels, and still later by ulceration into the pelvis of the kidney

If upon examining a patient you should suspect the presence of a hypernephroma, and then learn that the patient had never had a hemorrhage, that fact should not lead you to rule out the possibility of a tumor It is true that the first symptom in 25 per cent. of cases of tumor of the kidney is the passage of blood in the urine, but a patient may have a tumor for a considerable length of time without ever having any hemorrhage. In contradistinction to the hemorrhage associated with stone, the bleeding resulting from tumor of the kidney is independent of trauma and often painless, although the passage of a blood-clot down the ureter may give all the symptoms of renal colic.

Tumors of the bladder are much more common than those of the kidney Dr Kretschmer of Chicago in a series of 238 cases of hematuria found 60 cases due to tumor of the bladder about equally divided between benign and malignant growths, and 14 due to tumor of the kidney Cabot,[1] in a series of 344 cases of hematuria collected from the records of the Massachusetts General Hospital, found 24 cases due to bladder tumor and 12 due to kidney tumor

With both benign and malignant tumors of the bladder hemorrhage is commonly the first symptom. It may be slight at first, but is usually profuse, and more marked at the end of micturition. If the growth is filamentous it may float in front of the urethra and shut off the urinary stream just as a stone which lies free in the bladder We must always remember in

[1] Jour Amer Med Assoc. 1917 lxviii, 598
Differential Diagnosis, 1913 vol. i.

catheter to avoid contamination with the smegma bacillus, so that the centrifuge tubes must be absolutely clean.

Calculi may appear in the kidney in the ureter or in the bladder. Vesical calculi commonly originate in the kidney and after reaching the bladder become enlarged by the addition of calcium or other salts.

A stone may be present in the kidney without giving rise to any symptoms whatever. The presence of blood or pus in the urine may be the first indication, or the excruciating pain of renal colic due to the onward movement of the stone may first call attention to its presence.

If the stone passes through the ureter it may be discharged and the symptoms will entirely disappear. The passage of the stone is commonly accompanied by severe attacks of pain on the affected side, with pain radiating into the groin and testis, with frequent and intense desire to urinate, and with the passage of small amounts of bloody urine.

The passage of the stone makes the diagnosis certain. If it does not pass, an *x*-ray examination, made after thorough evacuation of the lower bowel, may reveal its location. If this fails, a cystoscopic examination will show blocking of the ureter on the affected side, or perhaps small amounts of bloody urine coming from the ureteral orifice. A wax tipped catheter will sometimes show the mark of a stone, or an "*x* ray catheter" passed to the site of obstruction will definitely localize it.

With a stone present in the bladder the patient frequently complains of a sudden stopping of the urinary stream, of increased frequency and burning upon urination, of pus in the urine, and intermittent attacks of bleeding. The bleeding may bear some relation to trauma and to activity. A tumor often bleeds at night while the patient is lying in bed; the hemorrhage associated with stone is usually induced by activity. The pain, burning, and increased frequency of urination are evidences of the cystitis which is practically always present. The stone itself may frequently be palpated with a sound. It can usually be detected by a careful cystoscopic examination and in the majority of cases casts a definite shadow on a radiographic plate.

ticular Severe bleeding will occasionally be met with in the dilatation of the bladder associated with spinal cord injury

The urethra, as you remember is divided into two portions, the prostatic and the membranous. One may find a posterior urethritis with ulcerations, trauma from the passage of a sound, or hypertrophy of the prostate with simple congestion. In these cases in which there is hemorrhage due to trouble in the prostatic urethra the bleeding is likely to occur at the end of micturition, due to the pressure downward of the sphincter on the inflamed area. If bleeding originates anterior to the prostatic urethra it appears at the beginning of micturition, and the last urine passed will be clear

I have not yet spoken of the so-called essential hematuria. Essential hematuria is in the same class with cryptogenic infections. At times we use words to conceal our ignorance and essential hematuria is a case in point. If a man has hematuria, there is some cause for it. We are finding that some cases of essential hematuria are due to varicose veins of the pelvis of the kidney and a considerable number of them are due to focal infections located in the papillæ of the kidney followed by scar tissue contraction and the formation of varicose veins in the papillæ. Other cases are due to small stones. In the privacy of your room you may speak of essential hematuria, but do not use the term to an intelligent patient or to a thoughtful member of the medical fraternity just admit that there are some conditions in which we do not know the origin of the hemorrhage, and in which we must keep on searching for the cause.

If we return for a moment to the history of these patients you will remember the second patient complained of hematuria, suprapubic pain, of burning on urination, of frequency of urination, and of pus in the urine. She also said the urinary stream stopped suddenly and that the blood passed clotted rapidly We would infer therefore that in all probability this blood came from the bladder and that in addition to a lesion causing hemorrhage the patient was suffering from severe cystitis.

The first patient complained of hematuria, frequent urina

these cases the possibility of malignant degeneration of a benign tumor and so the importance of making an early diagnosis.

The diagnosis is usually suggested by the history and can be readily confirmed by a cystoscopic examination, unless the bleeding is so profuse as to render the growth invisible. The usual location of these tumors near the trigone helps to make the examination easier.

The last common source of hematuria is found in enlargements of the prostate, either of the simple hypertrophic or the malignant type. The history of slowly developing obstruction, of increasing cystitis, of the passage of small amounts of blood, together with the physical findings, should make the diagnosis easy.

So far I have confined my remarks to the more common lesions because I wish to impress upon your mind their frequency and importance. Hematuria may however occur in a considerable number of uncommon lesions. These may be considered under the grouping of general and local causes. Let us ask ourselves what general pathologic conditions we may have causing the appearance of blood in the urine. In the first place, any severe infection, such as typhoid, pneumonia, influenza, or smallpox, which results in inflammation and congestion of the kidneys may cause hematuria. Second, toxic agents like turpentine and phenol may be the etiologic factors. Third, diseases of the blood and blood-forming organs—scurvy hemophilia, purpura, the anemias, and leukemias—may present an associated hematuria.

Of the local conditions producing hemorrhage we may have, first of all, trauma of the kidney; second, varicosities in the pelvis of the kidney; third, constriction of the renal veins because of abnormal mobility of the kidney; fourth, infarction of the kidney as in ulcerative endocarditis; fifth, simple pyelitis. Possibly out of 100 cases of hematuria 4 or 5 will be due to pyelitis. Bilharzia disease and filariasis are almost unknown in temperate climates.

The same group of local conditions causing hemorrhage occur in the bladder—trauma, varicosities, cystitis, prostatitis (in par

under treatment and an obstruction does occur it may seem wise to remove the prostate later

In the second patient we found a sessile fungating tumor mass, with a broad elevated base covered with calcareous deposit, just above and lateral to the right ureteral orifice. The base of the tumor was hard and indurated. The patient has an intense, diffuse, purulent cystitis. The urine is thick, stringy and almost pure pus. There is an edema of the bladder mucosa. A small section of the tumor was removed through an operating cystoscope for diagnostic purposes. The hemorrhage in this case unquestionably came from the bladder We shall treat it similarly to the first case, with repeated doses of radium applied through a suprapubic opening.

In the case of papilloma, if the growth does not appear to be sessile, we may assume that it is probably not yet malignant. Such growths should be fulgurated or removed by resection of the bladder In case of doubt it is often wise to remove the papilloma completely with its base, and suture the bladder Before this clinic three years ago I removed such a papilloma. On examination it was found to be an early carcinoma. The growth was so near the right ureteral orifice that the ureter had to be detached and transplanted into the fundus of the bladder The patient made a satisfactory recovery Two years later while I was away during the war my associate Dr Hammond, performed a nephrectomy because of a pyonephrosis that had developed in the kidney of the same side due to a stenosis at the point where the ureter was attached to the fundus of the bladder I mention this case because I am able to show this patient to you today without recurrence, and also because this case emphasizes the fact that transplantation of the ureters is not always followed by entirely satisfactory results.

tions, of stopping of the urinary stream, and of the symptoms of cystitis, although there is not a history of profuse hemorrhage as in the second case. In this case we must also assume that in all probability the hemorrhage comes from the bladder. Both these patients are seventy-two years of age. Both are at the age at which carcinoma is common, and the first patient, in addition, has hypertrophy of the prostate, which may be either a complicating condition or the primary source of his trouble. On cystoscopic examination we found in juxtaposition to the enlarged prostate a sessile, bleeding mass, and extending upward from it on the bladder wall a large ulcerated area about 4 cm. in width, with the typical appearance of an infected malignant ulcer. Under these circumstances what method of treatment ought we to adopt? If it is possible to remove the tumor it should be removed, as the patient is in fairly good condition. On the other hand, the growth is extensive, it has lasted for five years, and he is seventy-two years of age. Surgical interference would demand the removal of the prostate of practically the whole bladder and the transplantation of the ureters into the abdominal wall, or superficially in the lumbar region. It seemed better in this case to make a suprapubic opening into the bladder, remove the fungoid growth and the exuberant mass of epithelium with the cautery and then treat the affected area with radium. This plan of treatment is being carried out, the patient will receive three 50-milligram doses of radium applied for fifteen hours at intervals of a week, with the hope that it will at least end his cystitis and prolong his life, and possibly result in a cure.

The question as to the advisability of operation on the prostate, with the carcinoma so close to it and possibly arising from it, presents a difficult problem. It seems wiser, unless we are able to cure the carcinoma, not to remove the prostate, since at the present time there is no obstruction to the passage of urine. The patient's lowered kidney function, as evidenced by the excretion of only 45 per cent. of phenolsulphonephthalein in five hours, is another reason for being conservative as far as surgical intervention is concerned. If the ulceration improves

CLINIC OF DR. EDWARD LOUIS MOORHEAD

MERCY HOSPITAL

CHRONIC ULCER OF LEG TREATED BY SKIN-GRAFTING

Summary Patient presenting chronic ulcer of leg the result of pressure necrosis from plaster cast. Healing by skin-grafting. Technic of skin-grafting; autogenous graft the material of choice dressing of wound an important factor in obtaining successful result.

SOME of you will remember having seen this young man at a previous clinic. Briefly the history of the case is as follows

He is a single American, thirty years of age, and a clerk by occupation. Two years ago in a street car accident he received an injury to the anterior tibeal surface of the left leg He states that he was taken to a hospital where a plaster cast was applied to the leg This cast was allowed to remain on the leg for two months, during which time it was neither cut nor changed Upon removal of the cast there was a large, sloughing ulcer on the anterior and lateral sides of the leg at the junction of the middle and lower thirds.

Why the cast was applied in the first place is a mystery and why it was allowed to remain for so long a time is a still greater mystery There was no fracture of the bones of the leg at least no evidence of a former fracture can be demonstrated at this time. There was no radiographic examination of the leg made either primarily or at any subsequent time during his stay in that hospital. Can you imagine treatment such as this being given to an injury of this nature in this enlightened age? To begin with, if there were any question of fracture, it could have been easily proved or disproved by a radiographic examination. If there were no fracture, why the plaster cast? Again, if a circular plaster cast were applied to the leg why was it not split

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through the center so that it could be removed and the injured limb examined from time to time? The resulting ulcer was due, no doubt, to a pressure necrosis the result of the plaster cast.

Following the removal of the cast he remained in the hospital for several weeks and the ulcer was treated by the application of ointments and various dressings. Since leaving the hospital he has visited the different dispensaries, and previous to his admission to this hospital he had been dressing the ulcer at home.

He is a well-nourished young man, apparently in good health, and nothing is found in either his history or physical examination to account for the failure of the ulcer to heal, except that the area of destruction was too great for nature to overcome. However he admits the probability of having contracted syphilis some years ago although repeated Wassermann tests have given negative results. The Wassermann made since his admission to the hospital was negative. There are no varicose veins to account for the production or continuance of the ulcer.

At the time of his admission to the hospital the ulcer measured 4 inches in the vertical and 3 inches in the transverse diameter. The surface of the ulcer was covered with fairly healthy looking granulations, but the edges were hard, adherent to the underlying tissue, and immovable. The picture presented, therefore, was that of a large ulcer which nature had attempted to cover but the defect was too great, so that it was necessary to supply the tissue for this purpose.

Today you see the result of the skin-grafting operation performed four weeks ago. The ulcer is entirely covered and healed, a most typical and fortunate result.

There are a few points regarding skin-grafting which are well worth remembering. For reasons not entirely clear grafts taken from another individual, even a brother or sister rarely do well, and never so well as those taken from the patient himself. It must be from some cause similar to that which produces hemolysis when blood from two individuals is mixed.

The skin from the anterior outer and inner surfaces of the thigh is commonly used for cutting grafts. The skin is prepared

the day before by careful scrubbing with green soap and water shaving and thorough douching with sterile salt solution. The limb is then enveloped in a dry sterile dressing, which is removed at the time of operation. The cleaner and more healthy the granulating surface, the better and the greater the likelihood that the grafts will unite with the surface beneath and live. The granulating surface and the edges of the ulcer are cureted and all bleeding stopped by firm pressure with gauze packs before the grafts are applied. In this case the edges of the ulcer were dissected free from the underlying tissues to which they were firmly adherent.

The skin of the thigh is put on the stretch. The razor blade is held firmly at a slight angle to the skin and gradually advanced by a sawing motion, cutting the graft the desired length. During the cutting the blade of the razor and the skin are kept wet with salt solution, the assistant allowing it to dribble from wet pads of gauze. The blade and the graft curled up on it are then brought over to the raw surface to be covered and the graft is slid off the blade with a probe. Two probes are used to spread it evenly The graft should slightly overlap the skin edge of the wound. Other grafts are then cut until the raw surface is fully covered. Any blood which may have collected beneath the grafts is carefully pressed out with wet pads of gauze. The whole area is then covered with strips of rubber tissue wet in salt solution, after which a firm dressing of dry sterile gauze is applied.

The dressing may be left in place five or six days or even longer and if the grafting is completely successful the entire surface may be healed at the end of twelve days, after which a light boric acid ointment dressing may be applied for a week or two. The area from which the grafts are taken should be dressed in the same way as the grafted area. Some prefer dressing the grafted surface by exposure to the air under a cradle covered with gauze. This was the method used in this case.

MULTIPLE TUMORS OF THE THYROID

Summary Multiple tumors of the thyroid present for thirty-two years with no symptomatology until recently technic of removal after-care of goiter cases.

THE patient Mrs V an Austrian aged fifty three years states that she has had a swelling in the region of the right lobe of the thyroid gland for the past thirty two years. The swelling has been slowly increasing in size and now causes her great inconvenience when she attempts to swallow She is very nervous and becomes tired upon the least exertion.

Her past history is negative She is the mother of 4 children. One daughter twenty-six years old was recently operated upon for exophthalmic goiter There is no history of tuberculosis or carcinoma in the family

The patient is a fairly well nourished woman. The scalp is negative. Pupils are equal and react to light. There is no exophthalmos. Teeth are in bad condition. There is a large tumor mass on the right side of the neck over the thyroid region, extending from the angle of the jaw to the clavicle (Fig 336) Anteriorly and laterally it extends beyond the median line and covers the larynx. The upper portion of the tumor mass is very hard while the lower portion is soft. The entire tumor mass moves on swallowing There is no fluctuation or pulsation. Physical examination is otherwise negative.

Examination of a twenty four hour specimen of urine showed 950 c.c. specific gravity 1024 acid reaction no albumin, sugar or casts.

Blood examination showed 4,328,000 red cells 7000 leukocytes coagulation time three and a half minutes. Blood pressure was 135 systolic and 100 diastolic pulse-rate 35

The preoperative diagnosis was multiple tumors of the thyroid.

Operation.—Under ether anesthesia we are making the hockey-stick incision, the vertical arm of which is along the lateral margin of the tumor mass. The skin-flap with the platysma myoides is dissected upward and reflected to the left. The ribbon muscles are now retracted to the right, exposing the

Fig. 136.—*A* The upper or hard tumor mass. *B* Enlarged right lobe of thyroid.

surgical capsule of the gland. The capsule is incised in a vertical direction. The right lobe of the gland is large, soft, and very vascular. The superior thyroid vessels are now located, clamped, and ligated. By blunt dissection downward the gland is freed from the posterior wall of its capsule and the inferior

vessels are clamped and ligated. The isthmus is clamped, cut, and secured by an over-and-over suture, and the right lobe of the gland removed.

Up to this point the operation has been the usual one for the removal of the right lobe of the thyroid. However this operation is far from completion. There remains the upper hard portion of the tumor mass, which is larger than the portion already removed, and which is more or less fixed, its posterior part apparently being firmly attached. There is a flat band of thyroid tissue extending from it to the upper portion of the isthmus. This band is ligated at the isthmus and reflected to the right. There is a question whether the removal of this hard tumor mass can be accomplished. The attachment to the larynx on the side and to the sheath of the carotid posteriorly may prevent its removal. While it is probably a tumor of the thyroid, its hardness and firm attachments cause one to think of a probable growth arising from the lateral surface of the larynx or from the deep cervical fascia. By careful dissection a line of cleavage is found and the tumor mass is gradually enucleated. Posteriorly the attachment is quite firm, and as it is separated the sheath of the deep vessels of the neck is exposed. A few ligatures are applied to small bleeding points, making sure that there is complete hemostasis. Never close the wound of a goiter operation until you are satisfied that there is complete hemostasis. A small stab-wound is made in the center of neck below the collar incision in the suprasternal space and a small gutta-percha drain is introduced into the cavity left after the removal of the tumor mass. The surgical capsule is now closed by a fine continuous catgut suture. The muscles drop back in their place and the skin and superficial fascia are closed by a subcuticular catgut suture. The usual dressings are applied. The drain will be removed at the expiration of forty eight hours.

As soon as the patient is out of the ether she will be propped up in bed with the aid of a back-rest. She will be given an abundance of fluids by mouth. By the end of a week the patient will be allowed to leave the bed. Frequently after goiter

operations patients complain of difficulty in expectorating accumulations of mucus, and it may be necessary to give an expectorant. For the first few days liquid diet will be given, after which the patient will gradually return to normal diet.

This case is of interest because of the slow growth of the tumor and the gradual production of pressure symptoms. There were two distinct tumor masses, one the soft, vascular right lobe of the thyroid, and the other the hard mass so firmly attached and apparently of thyroid origin.

After-history.—The postoperative course was uncomplicated. The patient was out of bed at the expiration of one week and returned to her home on the fifteenth day.

The pathologic report on the tumor masses is as follows.

Section of thyroid unsatisfactory on account of delayed fixation. However areas of thyroid tissue can be made out. Stroma increased and hyalinized. Diagnosis: Adenoma of thyroid.

Examination of slide of hard tumor mass unsatisfactory as practically entire tissue had undergone partial or complete autolysis due to fixation being postponed for several hours. Section shows parenchyma and connective tissue, both hydrolized. There is a suggestion of gland structure in isolated portions, but the section has undergone so many changes due to defective preparation that the nature of the tumor is not positive and a diagnosis would be hazardous. There are areas showing a distinct inflammatory reaction, probably consequent to degenerative changes in the tumor.

The measurements of the hard tumor mass were 11 x 7 x 4½ cm. and of the soft tumor mass 8½ x 6 x 1½ cm.

CHRONIC DUODENAL ULCER: SLOW PERFORATION WITH FORMATION OF EXTENSIVE ADHESIONS TO GALL-BLADDER, LIVER, AND HEPATIC FLEXURE OF COLON

Summary Chronic duodenal ulcer of ten years duration. Operation reveals perforation on the anterior surface at junction of first and second portions. Closure of perforation. Indications for gastrojejunostomy in ulcer cases.

THE patient is a single American woman, fifty-eight years of age by occupation a teacher She states that she has been having bilious attacks twice a year for the past ten years. These attacks have varied in intensity During the past three months she has had three attacks the last one being very severe the pain was excruciating for about one hour and caused the patient to double up. The pain started in the epigastrium and moved downward and to the right side finally becoming generalized over the entire abdomen. These twice yearly attacks came generally in the spring and fall. Previous to four years ago the patient states that she felt fairly well between the attacks.

In describing the attacks she says that the pain is always on the right side of the abdomen at times it is high and again it is low on the right side. Occasionally there is a sharp pain across the abdomen in the region of the umbilicus. Frequently there is pain under the right shoulder-blade. There is always nausea and vomiting during the attacks. The vomitus contains a quantity of bile. Between the attacks there is a great deal of gastric distress, belching of gas, and distention or bloating after meals. She has been jaundiced, and at these times the stools were gray in color

There is nothing of importance in her past history except an attack of inflammation of the bowels and erysipelas twenty five years ago

Menstruation began at eleven years, regular five days duration, and not attended by much discomfort. Menopause occurred at thirty-eight years.

operations patients complain of difficulty in expectorating accumulations of mucus, and it may be necessary to give an expectorant. For the first few days liquid diet will be given, after which the patient will gradually return to normal diet.

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The measurements of the hard tumor mass were 11 x 7 x 4½ cm. and of the soft tumor mass 8½ x 6 x 1½ cm.

The patient has been under observation in the hospital for the past week. Her temperature has varied from 98.6° to 100° F To relieve the pain an ice-bag was applied to the abdomen and the patient given an occasional dose of morphin sulphate, grain ¼

From the history the physical findings, and the radiologist's report the tentative or preoperative diagnosis is a chronic duodenal ulcer with slow perforation, or a chronic cholecystitis with a resultant pericholecystitis and rather extensive adhesions of the surrounding structures. It is rather difficult to make a positive diagnosis in a case such as this, extending as it does over a long period of time, with intermissions during which the patient was apparently free from trouble. Analyzing the symptoms as given by the patient, one may easily ascribe them to gall-bladder disease. The pain in the upper right abdomen to the right of the median line and frequently radiating under the right shoulder blade, coming on suddenly followed by nausea and the vomiting of bile-stained material, and accompanied by jaundice and clay-colored stools the gastric disturbance, belching of gas, and distention after meals—all point to gall-bladder disease. However the present attack is somewhat different. The pain, very severe at first, was located high up on the right side of the abdomen, and then moved to the right and downward, finally extending over the entire abdomen. The pain remains general over the entire abdomen, but is more acute on the right side of the upper abdomen. There has been no cessation of the pain. There are persistent nausea and vomiting muscular rigidity and abdominal distention, indicating that there is an acute intra-abdominal condition which may have its origin in a slow perforating duodenal ulcer

In the differential diagnosis acute appendicitis must be considered. Sometimes the appendix is located rather higher up on the right side than normal. It has been found attached under the liver and over toward the median line. However a perforating appendicitis would have resulted by this time in general peritonitis and death, or in the formation of a large abscess, the escaping material from a perforating appendix being of a

The present attack began two weeks ago. The pain was at first very severe and was located high up on the right side of the abdomen, moving to the right and downward, and finally extending over the entire abdomen. There have been persistent nausea and vomiting. She is unable to retain anything in her stomach. Bowels are very much constipated.

Physical examination shows a poorly nourished woman, rather cachectic in appearance.

Chest A few rales are heard over the upper part of both lungs.

Heart There is a slight systolic murmur

The abdomen is slightly distended and tympanitic. There is muscular rigidity present which is more marked on the right side. To the right of the median line and extending downward from the costal arch to the level of the umbilicus there is an area of extreme tenderness, the slightest pressure causing great pain. Tympany is decreased over this area.

Blood examination shows 4,253,000 red cells, 12,000 leukocytes, and 70 per cent. hemoglobin.

Examination of a twenty-four-hour specimen of urine shows 1150 c.c. specific gravity 1015 reaction acid, no sugar albumin, or casts a few white blood-cells.

Chemical analysis of the gastric contents following an Ewald meal shows that 80 c.c. were recovered, with a total acidity of 100 and free HCl of 60 Occult blood was present. Repeated examinations of the stools reveal positive blood

Fluoroscopic examination of the stomach shows the emulsion passing through the esophagus freely The stomach is of the atonic type. The greater curvature reaches approximately 3 inches above the pubic arch. On manipulation, the stomach appears to be free and pliable Peristaltic function is normal. The pylorus closes off squarely to the tip The first and second portions of the duodenum show a number of filling defects which cannot be properly visualized This condition is probably due to a chronic ulcer of the duodenum or a gall-bladder infection, producing either adhesions or cicatricial tissue.

A series of radiograms confirm the fluoroscopic findings.

sheath and the peritoneum to be incised in the same direction as the skin and anterior wall of its sheath.

On opening the abdomen a very complex picture presents itself. The various structures, the liver gall-bladder duodenum colon, and omentum are all adherent and matted together giving evidence of a more or less extensive peritonitis (Fig. 337 1) Great care must be exercised in freeing these adhesions. The omentum is gently separated from the lower border of the liver and the colon, thus exposing the gall-bladder The gall-bladder is firmly fixed and it is with great difficulty that it is freed from the surrounding adhesions. There is a slight escape of fluid as the omentum is separated, indicating that there is a perforation of the duodenum. The liver is retracted upward and outward by a broad retractor The colon is held downward by a laparotomy pad and the stomach is held toward the median line by another pad. Other pads are placed in such positions as to protect any further invasion of the peritoneal cavity The duodenum is freed from adhesions, for if this is not done great difficulty will be found in closing the perforation.

The perforation of the duodenum is found on the anterior surface at the junction of the first and second portions (Fig. 337 2) The edges of the perforation are freshened and closure is made by a purse-string suture reinforced by a few Lembert sutures (Fig. 337 3) Fortunately the induration surrounding the ulcer is not of such a degree as to prevent closure in this manner In some cases the induration of the edges of the ulcer is of such a character that the sutures will not hold, and it may be necessary to excise a diamond-shaped section of the duodenum, including the ulcerated area, and suture the wound transversely to the long axis of the gut. In closing a perforation the sutures should be so placed as to avoid narrowing the gut as much as possible. Two lines of sutures should be employed so as to infold the perforation. Direct suture of the edges of the perforation will usually fail. The first layer of sutures should be placed at a slight distance from the edge of the perforation and the second layer still further away Many times this will

more virulent character than that from a perforating duodenal ulcer. There is no indication of any large abscess formation, and I am inclined to believe that the peritonitis is circumscribed, being confined to the right upper abdomen in the region of the gall-bladder and duodenum.

What is the proper treatment for this patient now? Surely the time for temporizing has past. There was a time when this patient should have received proper medical and dietetic treatment, and if the underlying cause of her present condition is a slowly perforating duodenal ulcer a cure no doubt would have been obtained. The treatment of gastric and duodenal ulcer is primarily medical, and it is only when that has failed that the case becomes surgical. The exception, of course, is in cases of hemorrhage or perforation where operation is imperative. Other surgical indications are rest for the duodenum and relief of obstructive symptoms, if such exist, which can be best accomplished by posterior gastrojejunostomy; separation of adhesions which may be interfering with the function of the biliary passages, pylorus, or duodenum; excision of the ulcer if suitably placed; threatened perforation.

Operation has been advised in this case on the basis of the tentative diagnosis.

Under ether anesthesia I am making an incision over the inner border of the right rectus muscle, from about 1 inch below the ensiform cartilage almost to the level of the umbilicus. The skin and subcutaneous tissues are now retracted and the anterior wall of the rectus sheath is divided. The rectus muscle is then separated from its sheath. It is easily separated from the posterior portion of its sheath by blunt dissection, but the anterior portion presents some difficulty at the insertion of the lines transversæ, one of which is found about midway between the ensiform cartilage and umbilicus and is crossed by this incision. The attachment of the muscle to the anterior wall of its sheath is very close at this linea transversa, and requires sharp dissection with knife or scissors. When the muscle is thoroughly freed from its sheath except at its outer border it is easily retracted outward, and allows the posterior wall of its

sheath and the peritoneum to be incised in the same direction as the skin and anterior wall of its sheath.

On opening the abdomen a very complex picture presents itself. The various structures, the liver gall-bladder duodenum, colon, and omentum are all adherent and matted together giving evidence of a more or less extensive peritonitis (Fig 337 1) Great care must be exercised in freeing these adhesions. The omentum is gently separated from the lower border of the liver and the colon, thus exposing the gall-bladder The gall-bladder is firmly fixed and it is with great difficulty that it is freed from the surrounding adhesions. There is a slight escape of fluid as the omentum is separated, indicating that there is a perforation of the duodenum. The liver is retracted upward and outward by a broad retractor The colon is held downward by a laparotomy pad and the stomach is held toward the median line by another pad. Other pads are placed in such positions as to protect any further invasion of the peritoneal cavity The duodenum is freed from adhesions, for if this is not done great difficulty will be found in closing the perforation.

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result in a decided narrowing of the duodenum. The suture line is further strengthened by bringing up a piece of omentum and attaching it over the suture line. There is marked evidence of

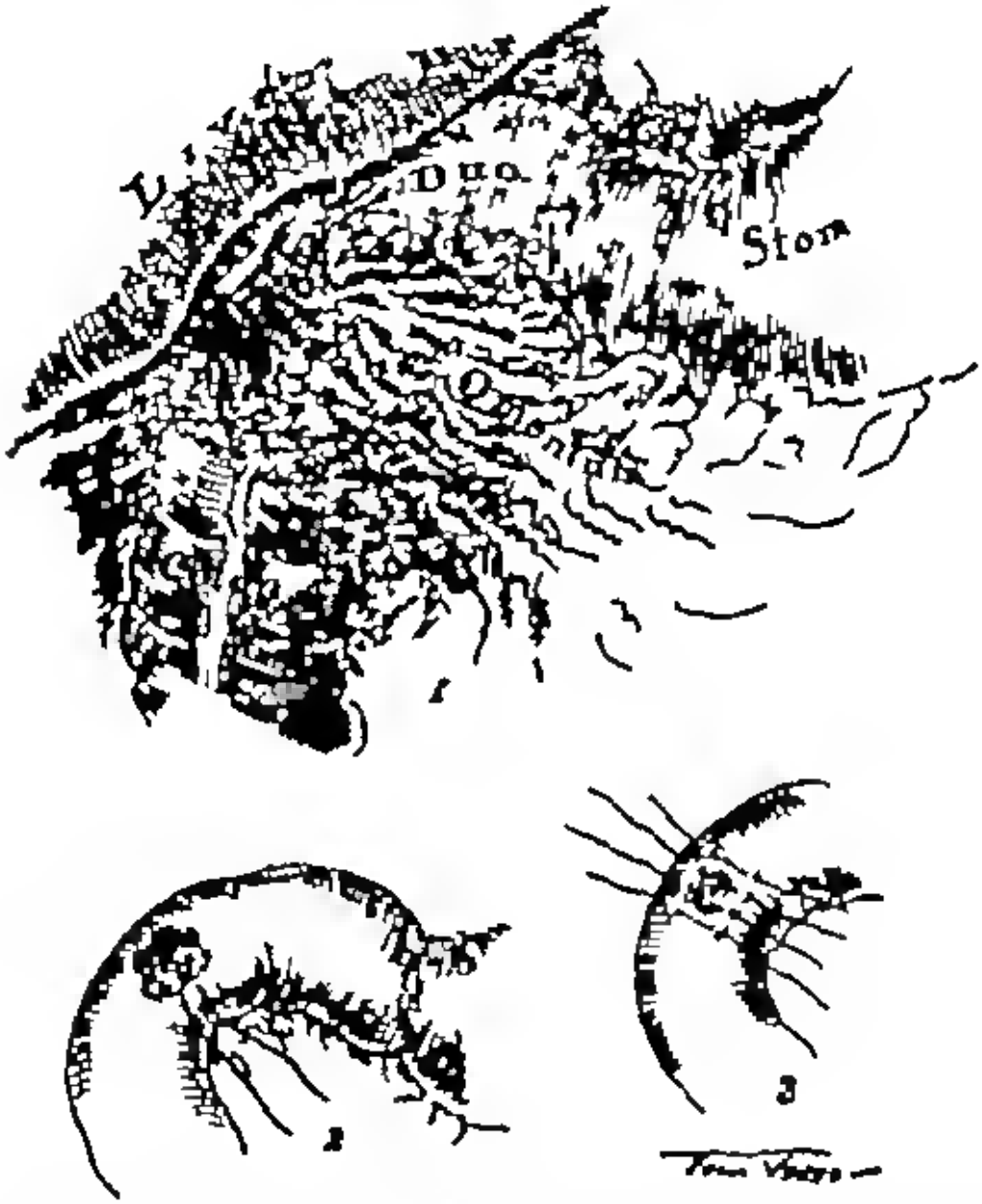

Fig. 137.—1, Condition found upon opening the abdomen, showing extensive adhesions, the result of the perforation of the duodenum. 2, Perforation of duodenum; purse-string suture introduced. 3, Purse-string suture tied and Lembert sutures introduced.

cholecystitis in this case, and while one is tempted to remove the gall-bladder perhaps under the circumstances drainage is the best procedure. A small rubber tube is introduced into the

gall-bladder by the usual method of invagination and a small cigarette drain is placed alongside the tube, down to the neighborhood of the suture line of the perforation, but not in contact with it. This cigarette drain will be removed at the end of forty-eight to seventy two hours.

As to the necessity of gastrojejunostomy being performed at the time of closure of the perforation, this should not be done as a routine. If the closure of the perforation produces a marked narrowing of the duodenum, then gastrojejunostomy is a necessity If the closure and subsequent healing of the ulcer are apt to result later in marked narrowing of the duodenum, if the operation is performed early before peritonitis has occurred and if the patient's condition remains good, gastrojejunostomy may be done at the primary operation otherwise it increases the danger to such a degree that it is best postponed to a later time. In the present case the duodenum has not been narrowed to such a degree as to indicate a gastrojejunostomy

The laparotomy pads are all removed, there has been no soiling of the peritoneum, and gentle sponging with a warm moist pad completes the toilet of the peritoneum. The abdominal wound is closed layer by layer in the usual manner and a large gauze dressing applied. The drainage-tube in the gall-bladder is coupled by a glass elbow to a rubber tube which drains into a receptacle attached to the side of the bed.

The after-treatment consists in keeping the stomach empty for a few days. Nutrient enemata will be employed to sustain the nutrition of the patient, and solutions of 5 per cent. glucose and 2 per cent. bicarbonate of soda will be used to maintain the fluid content of the body

Postscript.—The patient made an uneventful recovery and returned to her home at the expiration of four weeks with the wound completely healed. A recent communication from her states that she has gained in weight, has a good appetite, and has had no return of her former complaint.

CLINIC OF DR. GEORGE E. SHAMBAUGH

PRESBYTERIAN HOSPITAL

BILATERAL DESTRUCTION OF THE LABYRINTH AS A SEQUEL OF CHRONIC SUPPURATIVE OTITIS MEDIA

Summary Diagnosis. Loss of sense of motion as result of labyrinthine destruction. Changes in voice characteristic of various types of deafness. Characteristics of the most dangerous form of chronic suppurative otitis media. Technic of operation for diffuse suppurative labyrinthitis.

THE patient, a man aged fifty-three, consulted me October 20 1919 He had been aware of a slight discharge from both ears since childhood. He had always felt that his hearing was rather acute, and since he had no symptoms from the ears except a slight moisture he had never taken the ear situation seriously occasionally seeing a doctor and having the ears cleansed. Last April he had a slight operation in the right ear which, from his description, consisted of snaring out an aural polyp. This was done under local anesthesia at the doctor's office, and caused no unpleasant reaction. Three days later he developed intense vertigo with tinnitus and loss of hearing in the operated ear The vertigo was so intense and prolonged that he was confined to his bed for over ten days. Since that time he has not been able to hear in this ear As he was able to hear very well in the left ear he was not seriously handicapped because of the destruction of the right.

Ten days before consulting me he noticed a little blood-tinged discharge from the left ear when he again consulted his physician, who gave him an "oily' preparation to use in this ear probably carbolized glycerin. Very shortly after the first application, but probably not caused by the application, he

developed severe tinnitus and disappearance of hearing in this ear. This happened early in the forenoon. He relates that several hours later while taking dinner with some friends in the woods, he experienced a momentary vertigo, followed by no unusual disturbances during the rest of the day as he walked about the woods with no more difficulty than ever. On getting up the next morning, however, he found that his equilibrium was very much disturbed. He did not experience genuine vertigo such as was present subsequent to the trouble in the right ear, but he found that his gait was rather unsteady and that he would sway from one side to the other. This unsteadiness of his equilibrium has steadily improved. His one symptom, besides the unsteadiness of equilibrium and the loss of hearing, was the persistence of an occasional metallic ringing, which developed in the left ear, lasting only momentarily.

Examination disclosed in the right ear a perforation in the upper posterior quadrant of the membrana tympani, the remainder of the drum was intact. There was still a small amount of offensive discharge coming from the aditus. In the left ear there was a similar situation. In neither ear was there enough discharge to be perceptible, except on introducing a small pledget of cotton into the opening in the drum membrane.

The patient had a peculiar rasping high-pitched voice, which, his attendant informed me, had not been present before the loss of hearing in the left ear.

In testing the patient's hearing we found absolutely no vestige of hearing for any part of the tone scale either for air or for bone conduction. The large tuning-fork, such as the A (Bezold) was perceived as a jarring but not as a tone. An examination of the semicircular canals by rotation tests elicited no sensations of vertigo and no nystagmus. Romberg gave a positive response. With the eyes closed the patient swayed, but still was able to stand in the same spot. Attempting to stand on one foot, however with the eyes closed, the patient fell over immediately and would have fallen to the ground if he had not been supported. This was repeated a number of times, and each time we got the same response. A patient with the labyrinth

destroyed on both sides has no sense of motion and, with his eyes closed, will fall without appreciating just what is happening

A word of explanation might be said regarding the character of this man's voice. Very often a diagnosis can be made of the location of the ear trouble from the character of the voice. A patient who has a marked degree of deafness which is due to obstruction in the sound-conducting mechanism is very likely to have increased bone conduction. This is especially true of cases where there is bony fixation of the stapes, and in these cases the patient hears his own voice much more clearly than does a normal hearing person. The result is that he pitches his voice so low that we experience difficulty in hearing what he says. Patients who have ordinary labyrinthine deafness of a moderate degree show no alteration whatever in the voice, for the reason that the nerve deafness, until it becomes very extensive, involves the upper part of the tone scale, which is scarcely used at all in conversation tones. On the other hand, where there is total destruction of the function of hearing, if this involves both sides, the patient's voice undergoes a very marked alteration, due to the fact that he does not hear his own voice. This alteration, as a rule, renders the voice louder harsher and usually higher pitched than normal. It is not an uncommon experience to observe in a patient who has progressive otosclerosis the characteristic low voice which is present for a great many years, but which finally changes over to the loud rasping metallic voice, the change being due to the fact that as the disease progresses it finally results in destruction of the function of the internal ear

In this case there is no question about the conclusion that the patient has suffered total destruction of function, first in right ear last April and now in the left ear The onset in both cases was sudden, so we cannot attribute the labyrinth trouble to those degenerative changes which so frequently occur in the internal ear secondary to long-standing middle-ear disease. In both ears we find unmistakable evidences of the type of chronic suppurative otitis media, associated with osteitis. This diagnosis is based, first, on the character of the perforation, occupying as it does the upper posterior quadrant, located in the margin of

the drum membrane, with erosion of the bony attachment of the membrane and in the second place, the diagnosis is made from the character of the discharge. The amount of the discharge is not significant. Quite frequently the most dangerous form of chronic suppurative otitis media is in cases where the discharge is so slight that the patient is not aware of there being any moisture. The character of the discharge which is significant is the absence of mucus and the presence of an offensive penetrating odor which is caused by the disease of the bone. The usual type of a chronic running ear is the simple type, where the disease is restricted to the mucous membrane lining the middle-ear chambers. This is a disease which is not a distinct menace to the individual even in cases where the discharge may be quite profuse.

We have in this case, then, distinct evidences of a bone-invading process which we have long since learned to recognize as a condition which is likely to lead to serious complications, such as sinus thrombosis, meningitis, brain abscess, and, as in this case, invasion of the internal ear. When there is extension to the labyrinth of the ear the disturbance which is set up may be the result of a mild diffuse labyrinthitis, which results only in partial suppression of labyrinth function. These mild cases usually recover the function of the labyrinth. We term this condition serous labyrinthitis. The more severe cases result in total permanent destruction of the function of the internal ear not only the function of hearing but also the function of the semicircular canals. In these cases there exists diffuse suppurative labyrinthitis. Diffuse suppurative labyrinthitis may be a distinct danger to the patient, as it may result in an intracranial extension, especially along the route of the internal meatus. This results either in meningitis of the posterior brain fossa or cerebellar abscess located near the orifice of the internal meatus. In cases where there has been diffuse labyrinthitis destroying the entire function of the internal ear if symptoms of headache or other evidences of intracranial irritation arise, one should subject the case to a radical mastoid operation, followed by free drainage of the labyrinth. The operation upon the labyrinth is carried out

by chiseling away the promontory which is formed from the first turn of the cochlea. The chiseling is begun just below the lower edge of the oval window Following this the horizontal semicircular canal, where it forms a prominence in the floor of the aditus, is chiseled away and the anterior crus is followed until it opens into the vestibule. The opening in the labyrinth is, therefore, made in front and behind the ridge for the facial nerve. A complete exenteration of the labyrinth has been recommended but adds little, if anything, more to the safety of the patient than the operation establishing free drainage.

IMPAIRMENT OF HEARING DUE TO FRACTURE AT BASE OF SKULL

Summary: Methods of examination to determine unilateral deafness. The Dennert control. Objections to the use of noise apparatus. Rotation and caloric tests to determine functional capacity of semicircular canals

THE patient, a man fifty-one years of age consulted me October 6th because of defective hearing in the left ear which dated from an injury which he received last April. In attempting to escape from an automobile when crossing the street, he fell against the curb striking the back of his head. He states he was unconscious for about twenty four hours that on awakening he noticed severe tinnitus in the left ear and that he was hard of hearing on that side. He was kept in bed for three weeks, with a diagnosis of an intracranial clot as the result of injury He gives an indefinite history of sensations of vertigo while still in bed, but when he got up three weeks after injury he was annoyed very much from disturbance of equilibrium and this annoyance still persists six months after injury although it is not troubling him so much. He is chiefly anxious about his hearing and fears that the trouble may extend to the opposite ear

Examination discloses practically normal drum membranes. Hearing for the voice in right ear is normal. No hearing in the left ear for with the right ear closed the voice is heard just as clearly with the left ear closed as when it is left open. This method of examination is known as the Dennert control, and is a satisfactory method for determining whether a patient has any hearing for the voice. It is not applicable for the higher tuning forks or Galton whistle, because these are heard so readily through bone conduction. The C fork, vibrating 64 times to the second, was heard normally in the right ear but not heard in the left. The A tuning fork was also not heard in the left, but was normal in the right. The c^4 a high-pitched fork,

was heard normally in the right, but was not heard in the left. In examining the hearing with this fork one was not able to exclude the opposite ear by closing the meatus. It is possible, however to determine whether the patient has any hearing for the "c⁴" fork in the affected ear This is done by first closing the opposite ear The "c⁴" is then sounded loudly and held about 5 inches above the defective ear until the patient ceases to hear it. Then it is brought quickly before the external meatus of the affected ear If the patient begins to hear this fork when held before the meatus, after he had ceased hearing it when held 5 inches above the ear It is quite evident that the perception takes place in the ear examined and not in the opposite ear

A valuable test in determining one-sided deafness is carried out by using the 'a tuning-fork. This fork sounds rather loudly and yet, with the finger in the opposite ear there is no hearing for this fork in cases where the labyrinth is destroyed. Should the patient hear the "a¹ fork at all, it is evident that there is not a total defect in hearing in the ear being tested. As a matter of fact, the higher one goes in the tone scale the more difficult it is to exclude the opposite ear for the reason that the higher tones are less dependent upon the sound-conducting mechanism for transmission to the labyrinth, but the perception takes place more readily through bone conduction.

In examining this case with the Galton whistle we found that the hearing in the right ear was normal, whereas in the affected ear the only part of the scale which was not heard when the whistle was sounded before this ear with the opposite ear closed, was the stretch above 7 This does not mean that the patient heard the remainder of the whistle in the affected ear it simply means that the other notes of the whistle could not be excluded from the opposite ear

A satisfactory way of excluding the opposite ear in testing for one-sided deafness is by producing a noise in the normal ear Special apparatuses are devised for this purpose. There is one objection to their use that is very apparent, and that is this where the margin of hearing in the ear being tested is very low a noise apparatus applied to the normal opposite ear will prevent

the perception for this remnant of hearing in the ear being tested. One who is experienced in testing ears has little difficulty in establishing a diagnosis of unilateral deafness without the use of a noise apparatus.

In determining whether there has been a complete destruction of function in the labyrinth in a case like the one here demonstrated, it is necessary to test the vestibular mechanism. This is done by stimulating the semicircular canals either by rotation or by caloric stimulation. In this case the nystagmus resulting from rotating the patient to the right was very weak and lasted but nine seconds, whereas on rotating the patient to the left the nystagmus was more vigorous and lasted twenty seven seconds. In making the rotation test one cannot test each ear separately and yet we know that the most of the response which is obtained after rotation to the right results from stimulation of the left ear and vice versa. Where there is total destruction of function in one ear we find as a rule, just about the difference in the duration of the nystagmus which we found in this case.

In order to test each ear separately one has to employ caloric stimulation. In this case cold water syringed into the left ear for several minutes gave absolutely no response.

The diagnosis is total destruction of function for the labyrinth on the left side caused by a fracture at the base of the skull, passing through the petrous portion of the temporal bone. It is apparent from this discussion that the diagnosis based upon the symptoms and the functional tests is not a simple matter

CEREBRAL NERVE DEAFNESS

Summary Deafness following an attack of influenza. Diagnosis. Differentiation of internal ear and cerebral nerve disease.

THE deafness in this case occurred in a woman aged thirty six, and developed in the latter part of March, 1918, during an acute infection of the respiratory tract, which lasted less than a week. As her husband was ill with influenza at the time, her illness was attributed to the same cause, although she was not sick enough to be kept in bed. She did not seem to be able to make a complete recovery but continued in a state of fatigue and exhaustion, often remaining in bed for the entire day rarely being up more than a couple of hours a day She slept most of the time. Had no complaint about headache. Five weeks after onset of illness she began to notice loss of hearing, associated with severe head noises no vertigo. Two weeks after onset of ear symptoms she was totally deaf, as far as ability to hear the voice was concerned.

The patient was seen by me October 8 1919 She complained of deafness, tinnitus, and lack of energy which had kept her in bed part of each day since the onset of her trouble. At no time has there been any vertigo Her husband states that on several occasions, on waking up in the morning, she seemed to be temporarily dazed, attributing noises in the head to the breaking of windowpanes in the house at other times to the explosions of bombs, which she said returning soldiers were dropping about the house.

Examination of the ears disclosed no evidence of middle-ear trouble. The patient was not able to hear the spoken voice. The "C fork, vibrating 64 times to the second was not heard in either ear "A fork was heard both by bone and air conduction, in both ears indistinctly In a fork of this type it is not difficult to confuse a jarring sensation with the perception of tone "a'" fork was not heard in either ear by either bone or

air conduction c^{4}" vibration 2048 times a second, was heard in both ears very faintly The Galton whistle was heard practically throughout its entire extent, but always very indistinctly

No middle-ear process, not even complete bony fixation of the stapes, which is not associated with degenerative process in the inner ear can ever produce anything more than a moderate depression of hearing function. Severe deafness always means defect in the nerve mechanism, which may be secondary degeneration of the eighth nerve a condition which frequently follows long-standing middle-ear disease.

The absence of vertigo does not exclude the possibility of a degenerative process involving the vestibular mechanism, although in a case where the degeneration in the labyrinth has advanced so rapidly as in this case, if the vestibular mechanism is involved simultaneously with the cochlear apparatus, vertigo is to be expected. Where a degenerative process develops slowly it is possible for it to go on to a point of complete suppression of the function of the semicircular canals without at any time giving rise to the symptom of vertigo.

Examination of the vestibular part of the labyrinth in this case showed that it responded normally to stimuli. This test was carried out by turning the patient in a rotating chair with the head fixed in the upright position. It was found on rotating the patient ten times to the right that on stopping rotation a very vigorous horizontal nystagmus developed, which lasted over twenty seconds, and a similar response was elicited by rotating the patient to the left.

The diagnosis of nerve deafness is very easily made in a case of this sort. The determination of the location of the deafness is quite another matter as this may be due to changes in the internal ear or changes in the central nerve tracts in the brain Where a patient develops, as the result of an acute infection, depression of hearing due to changes in the internal ear the changes here are in the nature of labyrinthitis and where the function is not completely destroyed we would term the process in the labyrinth "serous labyrinthitis. Serous labyrinthitis is likely to be unilateral, and at the same time it is hardly to be

imagined that such a process would not involve the entire labyrinth, that is, the cochlea as well as the semicircular canals. In this case the involvement was bilateral and involved only the hearing part, so that we can reasonably exclude the labyrinth itself as the seat of the trouble.

The conclusion we reach here is that the defect in the hearing is due to involvement of the cerebral centers of hearing, which are quite apart from the centers for the vestibular nerves. An analysis of the patient's general symptoms would warrant the diagnosis that she had suffered from a form of encephalitis which had produced bilateral paralysis of the cochlear nerve. The duration of the defect, lasting six months, would seem to exclude the probability of a recovery

AURAL VERTIGO DUE TO DEGENERATION OF VESTIBULAR NERVE WITHOUT INVOLVEMENT OF COCHLEA

Summary: Vertigo always an aural symptom with or without involvement of hearing. Value of checking the rotating with the caloric tests in study of function of semicircular canals. Basis for diagnosis in present case.

Before the writings of Ménière, which appeared in 1861 the symptom of vertigo was always attributed to intracranial disease, and when Flourens published the results of his experiments in operating on the semicircular canals of pigeons and recorded the phenomena of vertigo physiologists were inclined to explain the symptoms he had observed as the result either of traumatism to the brain while doing the operation or to the subjective noises which they assumed would result from the traumatic injury of the sound-perceiving mechanism of the internal ear. Vertigo is now recognized as always an aural symptom, in the sense that it is always due to some disturbance of the vestibular mechanism, just as tinnitus aurium is always an aural symptom the result of disturbance of the cochlear mechanism. In either case this disturbance may be due to disease located in the labyrinth itself or to some central interference with the intracranial pathway of the eighth nerve. In a general way we expect to find vertigo which results from disease of the peripheral mechanism associated with an involvement of the hearing. This is also true of lesions located in the cerebellar pontine angle, where both the cochlear and vestibular nerves are found combined in forming the eighth nerve. A disease beginning in this locality may for a considerable period produce symptoms of disturbance of either the cochlear or vestibular nerves separately. It is rather characteristic of vertigo caused by intracranial disturbance that the hearing is not involved.

In the case which I am here demonstrating the conclusion which I have reached after completing the examination is that the vertigo is due to disease in the peripheral mechanism, that is, in the labyrinth although we find no evidences of involvement of the cochlea.

The patient is a woman aged thirty-seven, who consulted me October 17 1919 giving a history of no general constitutional disease. Her general health has been good. She had her first attack of vertigo, which came on in the middle of the night, the end of November 1918. The attack was not associated with tinnitus aurium nor with a defect in hearing. There was nystagmus and nausea and vomiting. She recovered from the attack in less than a week's time. Was confined to her bed only three days. The next attack developed in January 1919 coming on again in the middle of the night, and was not associated with any disturbances of hearing. This attack was more severe than the first and she was kept in bed, because of the vertigo, for two weeks. There was intense nausea and vomiting during the first days and a violent nystagmus, although I could not gather whether the nystagmus was directed to the right or toward the left. Since then the patient has had milder attacks and still feels somewhat uncertain as regards equilibrium.

On examining the patient I found a central perforation about 2 mm in diameter in the right drum membrane. The ear however was quite dry and the patient states that the perforation was the result of an injury inflicted while digging in her ear with a hairpin eighteen years ago. She had never experienced any discharge. The left drum membrane was normal. The functional tests showed only a very slight depression of hearing for the whispered voice. The Weber was lateralized to the right and the Rinné in the right ear was negative, but positive in the left. Testing the various parts of the tone scale disclosed a moderate defect restricted to the lower part of the tone scale. The higher notes were heard normally. The hearing in the left ear was entirely normal.

The patient was the wife of a physician who was aware that there was a perforation in her right drum membrane and naturally was inclined to attribute the attacks of vertigo to some disturbances resulting from this perforation in the right ear.

In testing the vestibular mechanism we found that there was no spontaneous nystagmus. Spontaneous pointing was also normal for both arms. In rotating the patient to the right

she developed a weak horizontal nystagmus to the left, which lasted only nine to ten seconds. After rotating the patient to the left there developed a much more vigorous horizontal nystagmus to the right, which lasted fully twenty-three seconds. The pointing tests after rotation showed the normal past-pointing when the patient was rotated to the left, that is, for both the left and right hands the patient past-pointed to the left from 4 to 6 inches. After rotation to the right the patient still past-pointed but, as might be expected where the resulting nystagmus was so slight, she past-pointed only about 4 or 5 inches for the right hand and not more than 2 inches for the left.

It is not uncommon to discover that the responses from stimulation of the horizontal canals may be normal, whereas the caloric stimulation of the superior canals may fail to give a response. For this reason I thought it best to complete the examination by making the caloric test. In applying this test in a case where there is a perforation of the drum membrane one must avoid the use of cold water as this is very likely to bring on an acute suppurative otitis media. A normal caloric response was obtained in this patient's right ear by allowing compressed air to be driven into the external meatus. There developed in less than a minute's time a rotary nystagmus, with the quick component directed to the left. In the left ear we resorted to the usual method of irrigation with cold water. To try to get a caloric response by injecting cold air into the external canal with the drum membrane intact would be a very tedious procedure. The injection of cold water into the left ear in this case developed a rotary nystagmus directed to the right, but the nystagmus came on rather slowly taking fully two minutes before it began to appear.

The conclusion which I have reached in this case is that the patient has a degenerative process involving the vestibular apparatus, apparently only in the left ear.

Where an intracranial lesion is causing vertigo we are very likely to get abnormal pointing reactions after stimulation of the semicircular canals.

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CLINIC OF DR. EDWARD LYMAN CORNELL

CHICAGO LYING-IN HOSPITAL

CESAREAN SECTION FOR PLACENTA PRÆVIA

Summary The proper handling of cases of placenta prævia in order to have living child. Technic of classical cesarean section. Varieties of placenta prævia—advantages of blood transfusion in these cases.

SOME of you will recall that this patient entered the hospital March 28th about midnight. She is a Jewish woman, thirty-one years old, gravida II. Menses began at fourteen years of age. They have always been regular twenty-eight day type, of three days duration, with slight pain. Her last menstrual period was September 14th. She felt the baby January 30th. Her last pregnancy two and a half years ago resulted in miscarriage at four months. At that time she was not under my care and no effort was made to determine the cause of the miscarriage. The Wassermann test made on her blood is negative. On March 28th she went down town about noon shopped around, had dinner with her husband in the evening, and went to the theater On the way home she noticed some bleeding which became worse when she went to the toilet. She called me up and I sent her into the hospital. She was not having pain. Two small blood-clots were passed and there were no uterine contractions. She was given ¼ grain of morphin and put to bed. The bleeding subsided the next day but she was kept in bed for five days.

She was allowed up in the chair on the sixth day and remained up for three days, when she started to bleed again and passed another rather large blood-clot. She had no pain and no uterine contractions. An ice-bag was placed on the lower abdomen. She was then kept in bed continuously until May

rhage and the added risk of losing the child due to the interfer ence with the fetal circulation, and also to the trauma to the child which goes with uterine contractions. I fully appreciate that there is a certain risk to the mother attending cesarean section, but this patient has been in the hospital for over a month, has had no vaginal examinations, and has never had a rise in temperature. Therefore the risk to the child is less from above than in labor from below I feel we are justified in doing a cesarean section, especially in view of the fact that this patient is willing to undergo anything in order to get a live baby My original plan in this case was to carry her along, providing she had no uterine contractions and, if necessary to replace the volume of blood lost by blood transfusion. With this idea in view I had her and her husband a blood typed, and found them compatible. We have been in constant touch with him so that we could transfuse the patient within a very short time. I have never tried this plan as yet. It was suggested to me by Dr De Lee and theoretically I can see no serious objection. We might thus be able to tide one of these placenta previas over at least until such time as the fetus is viable. We have pro-longed this case for over a month and have a better opportun-ity to get a living child than if we had interfered when she first came in. As it is a case of placenta praevia, we shall do a clas-sical cesarean section.

Under ether anesthesia I am making an incision beginning about 6 cm. above the umbilicus and carrying it around to the left and about 5 cm. below You notice that as soon as the peritoneum is opened we have a uterine contraction which causes the uterus to stand up in the abdomen. We will wait until the contraction is over and, in the meantime, pack the intestines off with this rubber-dam laparotomy pad. This pre-vents the intestine from appearing in the wound and also keeps the liquor amnii, blood etc. from the abdomen. It has an ad-vantage over gauze pads in that there is very little trauma. The rubber does not become adherent to the intestines. The uterine contraction is now over and we will make an incision in the musculature about 4 cm. below the fundus. The child is

in our continuous suture only the uterine mucosa, being careful not to insert the catgut in the uterine cavity After reaching the upper end we retrace our steps, gathering in the first layer of the muscular fibers. When we reach the lower end of the wound we tie a knot to the end of the suture already there. This makes two rows of suture. Another suture is then started in the next layer of muscle at the upper end of the wound and a single knot tied as before. A continuous stitch is used and when the lower end of the wound is reached the suture is carried through to the peritoneum. The suturing is then continued on the peritoneal surface of the uterus and carried up to the upper end of the wound, where it is tied in such a manner that the knot is buried. This makes four layers of sutures. Now as a precautionary measure, we insert four to six interrupted catgut sutures, taking rather deep bites. In this case we will use five. We will now remove the rubber-dam, and you note that none of the intestines can be seen. The omentum is placed over the uterine incision and the abdominal wall is closed in the usual manner I want to call your attention to the plastic work we are doing on the navel. If the navel is not sutured carefully we are apt to get some infection or the accumulation of secretion, with a more or less marked deformity resulting As the patient only sees the scar I feel that the cosmetic effect is important. It is really surprising how often the laity judge a surgeon by the condition of the scar

The patient is in good condition, pulse 108 respirations 24 and color good. We will now examine the placenta. We find on the left side an area dark in color having somewhat of an odor This is a blood-clot. We also find somewhat higher up evidence of an organized blood-clot with beginning fibrous degeneration, so that our diagnosis has been confirmed both from the operation and from the appearance of the placenta. The nurse has weighed the baby and tells us that it weighs 4 pounds, 8½ ounces. It has a fairly vigorous cry The air passages are clear and it is well formed.

I would like to take this opportunity to discuss with you the subject of placenta previa. We divide this condition into

readily extracted and breathes almost immediately The assistant is clamping the cord with two clamps and will cut between. As the baby is in good condition it is passed to the assistant and we will proceed with the operation 1 c.c. of pituitrin is injected directly into the uterine muscles, half on one side of the incision and half on the other She is also given 1 c.c. of pituitrin subcutaneously and 1 c.c. of ergot. There is no particular rush about the removal of the placenta. You will note that it is located on the posterior wall of the right side of the uterus. If you look in carefully you can see that the cervix is well covered by the placenta and it is a placenta previa lateralis. The uterine contractions now force the placenta away from the wall, and as there is very little bleeding from the wound we will wait until the next contraction before attempting to remove the placenta from the uterus. In the meantime there will be a certain amount of blood passed between the placenta and the uterine wall, helping to separate them. Considerable care should be exercised in removing this placenta so as not to produce trauma. We lift it up gradually taking care that we remove the membrane entirely I do not want to examine this placenta at the present time because the probabilities are that this surface over the cervix contains bacteria which may prove infective to the wound. By inspection from above we see that the uterine cavity is free of cotyledons. We note that the uterus is now well contracted so that we will start sewing up.

It is important, in sewing up classical cesarean sections, that the apposition be accurate. We have three layers of muscle in this portion of the uterus. They have the power of contracting in different lines of direction so that, if the musculature is not well sewed, in the course of involution muscular contraction is liable to cause a separation and you get a seepage of uterine material into the wound and perhaps into the peritoneal cavity causing an infection. Aside from that, the uterine scar will not be in good condition, and in subsequent pregnancies you are liable to have a rupture The first suture is of single No. 2 twenty-day chromicized catgut. We start at the lower end of the wound and tie a single knot, including

in our continuous suture only the uterine mucosa, being careful not to insert the catgut in the uterine cavity After reaching the upper end we retrace our steps, gathering in the first layer of the muscular fibers. When we reach the lower end of the wound we tie a knot to the end of the suture already there. This makes two rows of suture. Another suture is then started in the next layer of muscle at the upper end of the wound and a single knot tied as before. A continuous stitch is used, and when the lower end of the wound is reached the suture is carried through to the peritoneum. The suturing is then continued on the peritoneal surface of the uterus and carried up to the upper end of the wound, where it is tied in such a manner that the knot is buried. This makes four layers of sutures. Now as a precautionary measure, we insert four to six interrupted catgut sutures, taking rather deep bites. In this case we will use five. We will now remove the rubber-dam, and you note that none of the intestines can be seen. The omentum is placed over the uterine incision and the abdominal wall is closed in the usual manner I want to call your attention to the plastic work we are doing on the navel. If the navel is not sutured carefully we are apt to get some infection or the accumulation of secretion, with a more or less marked deformity resulting As the patient only sees the scar I feel that the cosmetic effect is important. It is really surprising how often the laity judge a surgeon by the condition of the scar

The patient is in good condition, pulse 108 respirations 24 and color good. We will now examine the placenta. We find on the left side an area dark in color having somewhat of an odor This is a blood-clot. We also find somewhat higher up evidence of an organized blood-clot with beginning fibrous degeneration, so that our diagnosis has been confirmed both from the operation and from the appearance of the placenta. The nurse has weighed the baby and tells us that it weighs 4 pounds, 8½ ounces. It has a fairly vigorous cry The air passages are clear and it is well formed.

I would like to take this opportunity to discuss with you the subject of placenta prævia We divide this condition into

three groups first, the *marginal* type, in which just the edge of the placenta is over the internal os second the *central* type, in which the center of the placenta lies over the internal os, third, the *lateral* type in which that portion of the placenta between the margins and the center lies over the internal os.

The etiology of placenta previa is somewhat obscure. It is generally believed that the low insertion of the ovum is a factor Another theory is that the placenta develops in the reflex portion of decidua and then comes to lie over the internal os of the cervix. The predisposing factors are endometritis, subinvolution of the uterus, multiple pregnancy and numerous pregnancies. In most of these cases, if one questions the patient, a history will be obtained of accidental abortion or of some inflammation of the genito-urinary tract. Many times the inflammation is mild and the patients do not suffer a great deal of annoyance.

The symptoms in this condition are quite characteristic. The first sign is hemorrhage, varying in quantity from a blood-stained mucus to a flooding This hemorrhage comes on without pain and apparently without cause. It is usually seen in the last three months of pregnancy although it may occur earlier Doubtless many abortions are due to this cause, especially those in which there is considerable bleeding The possible connection between abortion and placenta previa is frequently overlooked. The hemorrhage may stop on placing the patient in bed or it may continue. It usually stops only to recur at a later date, often within two weeks. The second bleeding is more severe than the first, and with it may come labor-pains. Occasionally however the second bleeding will stop and a third attack will come on in a week or ten days. This last attack is most certain to be accompanied by labor-pains and considerably more bleeding These symptoms are practically constant in every case.

The loss of blood results in a secondary anemia, the severity of which varies with the individual case It is unwise to carry the patient to term where there is a constant loss of blood. As there is no means of estimating the amount of blood lost, it is rather dangerous to allow the patient to continue bleeding.

This is where blood transfusion plays a part. One should be prepared to transfuse at a moment's notice and should have a donor ready at more or less instant call.

The complications met with in placenta previa are malpositions and non-engagement of the head. Among the malpositions are breech and shoulder presentation, which are due to the placenta occupying the lower uterine segment.

The pains in placenta previa are frequently very weak. This accounts for the non-engagement of the head and also many times, for postpartum hemorrhage. Postpartum hemorrhage is a frequent accompaniment of placenta previa, due to the fact that the lower uterine segment has not the power of contracting sufficiently to close off the uterine sinuses. The blood-clots which form in the lower uterine segment are not strong enough to check the bleeding It is fortunate that most of the uterine vessels enter the body of the uterus, so that the contraction of this portion shuts off to some extent, the flow of blood.

Another complication frequently met with is adherent placenta. It becomes necessary to remove it manually and the bleeding is sometimes terrific.

In the puerperium the complications met with are infection of a piece of retained placenta which may lead to septic thrombosis of the uterus or broad ligament, and to a typical case of puerperal sepsis, and, second subinvolution of the uterus, which is frequently met with.

The treatment today is somewhat different from what it was several years ago At this hospital we confine our treatment to the introduction of bags the Braxton-Hicks version, and to cesarean section. Generally speaking in primiparæ near term, with the lateral or central variety of placenta previa, where the cervix is not dilated cesarean section is the treatment of choice. In multiparæ who give a history of having had easy labor where the cervix is partially dilated or easily dilatable, bags are used and in exceptional cases the Braxton-Hicks version. Generally speaking the other methods have been discarded. I especially want to condemn the *accouchement forcé*

We usually introduce the Voorhees bag which has a flat top, placing the bag above the placenta. This necessitates rupturing the membranes. The object of the bag is to cause pressure on the placenta in such a manner as to shut off further bleeding. Cragin, in his work on Obstetrics, and recently Kosmak have recommended the extra-ovular introduction of the bag. This means that the placenta and membranes are pushed up from the lower uterine segment and the bag inserted between the placenta and the cervix. They state that this method gives better results. Personally I have had no experience with this method and therefore cannot express an opinion. The object in any line of treatment should be the saving of blood—to stop the hemorrhage. I wish to emphasize this as strongly as possible. The fetal mortality with the bag in the Braxton-Hicks method is greater than by cesarean section, while our experience proves that the danger to the mother is about equal in any method.

We introduce a large 11 or 12-cm. bag in order to obtain complete dilatation of the cervix. This has an advantage over the smaller size bag in that only one handling is necessary. If the bleeding does not stop after the bag is fully distended, a weight is attached to it and just sufficient traction made to stop the oozing. Frequent rectal examinations are made, and as soon as the bag is found to be in the vagina it is removed either by traction or by emptying it. If the head does not come down readily a version is done and a leg brought down to stop the bleeding. After dilatation is complete one may deliver at once, but I must caution against attempting to deliver a breech through an improperly prepared cervix. As tears are more likely to occur we of course, defeat the purpose in that considerably more bleeding is produced. Further it is very difficult to repair a torn cervix in placenta previa cases in order to control the bleeding.

It is not necessary to take up cesarean section, as this has been well discussed in the first part of the clinic.

The third stage requires considerable dexterity and judgment in its management. Here again we must stop the hemor

rhage. That is the prime factor A hypodermic injection of 1 c.c. or mil. of pituitrin is given immediately after the baby is born. This is followed within three to five minutes by 1 c.c. or mil. of aseptic ergot. If the placenta seems to be adherent, it is removed manually If not, it is allowed to remain five to fifteen minutes providing the bleeding is not excessive. It is frequently necessary to pack the uterus. This is especially so in those cases in which the cervix has been torn. Our plan is to fill the uterus snugly with from 6 to 8 yards of gauze and then to repair any tear in the cervix by interrupted forty-day catgut sutures over the packing. This controls the bleeding while the repair is going on. After the repair is complete the vagina is packed with wet cotton in order to exert counterpressure. The cotton may be removed in twenty four to forty-eight hours and the packing from twelve to twenty-four hours later If the bleeding is not severe and the placenta comes away normally or by means of early expression, the patient is left alone, but is carefully watched for signs of postpartum hemorrhage. In most of these cases it is our practice to give normal salt solution both per rectum and under the skin. We use anywhere from 1000 to 4000 c.c., depending upon the loss of blood.

After-history —This patient left the hospital on the eighteenth day Her highest temperature was 99 4° F on the fourth day and highest pulse was 100 on the second day She complained only of gas-pains, which were gone on the second day She was allowed out of bed on the twelfth day The baby was given mother's milk obtained from other mothers, 20 drops of milk and 20 drops of water every two hours for the first day The second day this was increased to 30 drops of milk and 15 drops of water On the third day the baby was put on three-hour feeding and given 2 drams of mother's milk and 1 dram of water On the fourth day it was put to the breast, where it obtained an ounce. This was supplemented with 3 ounces of mother s milk. It lost in weight, on the fifth day weighing 3 pounds, 14½ ounces. The effort of nursing from the breast was very tiresome to the baby and was discontinued on the sixth day The baby then took 6 drams of mother's milk every three hours. On the seventh day

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CONTRIBUTION BY DR. ROY L. MOODIE

DEPARTMENT OF ANATOMY UNIVERSITY OF ILLINOIS

SURGERY AND DISEASE AMONG THE PRE-COLUMBIAN INDIANS OF NORTH AMERICA

Summary Evidence of disease and surgical practices scanty and confined to lesions on bones and analogies from recent practices. The North American Indians knew less of surgery at the time of the coming of white men than any other primitive people. Trephining unknown north of Mexico actual cautery used extensively; bandages and splints of variety of types used in fractures small tumors excised; phlebotomy used extensively in recent centuries, probably acquired from white men; crutches, possibly introduced by the whites, were in use in the past century; boils and abscesses were opened by flint flakes.

It is impossible at the present time to discriminate between the surgical knowledge of pre-Columbian times and later when the primitive practices were modified by the influence of their contact with white men.

A variety of diseases indicated by lesions on the bones. Numerous forms of arthritides, periostitis, exostoses seen on skeletal remains. Caries of the teeth moderately well represented. Sarcoma indicated. Fractures often well healed owing to the well-developed practice of using rawhide, pads of clay lattice-work, and bark splints for the support of the fractured limbs. Presence of syphilis uncertain. Injuries due to war practices, such as arrow-point wounds, are common.

THERE is considerable evidence to show that many diseases prevailed among the Indians north of Mexico prior to the advent of the white people. The condition of the skeletal remains, the testimony of early observers, and the present state of some of the tribes in this regard, however warrant the conclusion that, on the whole, the Indian race was a comparatively healthy one. It was probably spared at least some of the epidemics and diseases of the Old World such as smallpox and rickets, while other scourges, such as tuberculosis, syphilis (pre-Columbian) typhus, cholera scarlet fever cancer etc., were rare if occurring at all.

it took 6 drams and on the eighth day 1 ounce, when it started to gain slowly On the tenth day it was taking 12 drams of milk and weighed 3 pounds, 15½ ounces. At this time Dr Hoffmann suggested that we feed the baby on albumin-milk in addition to the milk we could obtain from the mother The mother was milking her breasts daily The baby began to gain immediately and at the time of discharge it had regained its birth-rate. On August 15th the baby weighed 9½ pounds.

Our knowledge of the antiquity of man on the North American continent is limited to the rather indefinite testimony furnished by tradition, by the more definite but as yet fragmentary evidences of archeology and by the internal evidence of general ethnologic phenomena. No one can speak with assurance on the authority of either tradition or history of events dating back further than a few hundred years, and the highest estimates do not exceed a few thousand years. There is no definite accepted chronology such as exists for the Egyptian peoples. Careful researches by Hrdlička have shown conclusively that no human remains of any great antiquity have as yet been discovered on this continent, and there seems little chance of their occurrence in this region.

The erection of the mounds by the Mound Builders probably was continued for many hundred years and did not end until after the advent of white men. The mounds vary in extent, measuring from a few feet to 1000 feet in diameter and also in mode of construction and contents. Many of the data on pathologic lesions given below are based on material obtained from these mounds.

Data regarding the skeletal lesions of the North American Indians are relatively rare, and are to be found scattered throughout a wide range of anthropologic literature and on material contained in many museums. For guidance in the search for the evidences given below I am indebted to Dr Ales Hrdlička, who has written more than any other student on the diseases of the North American aborigines. Under his supervision there has been assembled at San Diego California, a large collection of early Indian skeletal remains illustrating this phase of Paleo-

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upward, into which a hollow reed could be inserted. This instrument was possibly used in cupping by pressing the hollowed-out end against the skin, and sucking out the air through the reed. The smaller object is Cliff Dweller stone pipe which may also have been used in cupping and in the suction treatment of abscesses and suppurating wounds. (After Freeman.) 4 The object on the left is a sharp-pointed flint flake such as the primitive Indians used in opening veins or boils. The one to the right served as a knife. Such flint flakes are very common in archeologic collections. It is not probable that the Indians designed implements exclusively for surgical purposes.

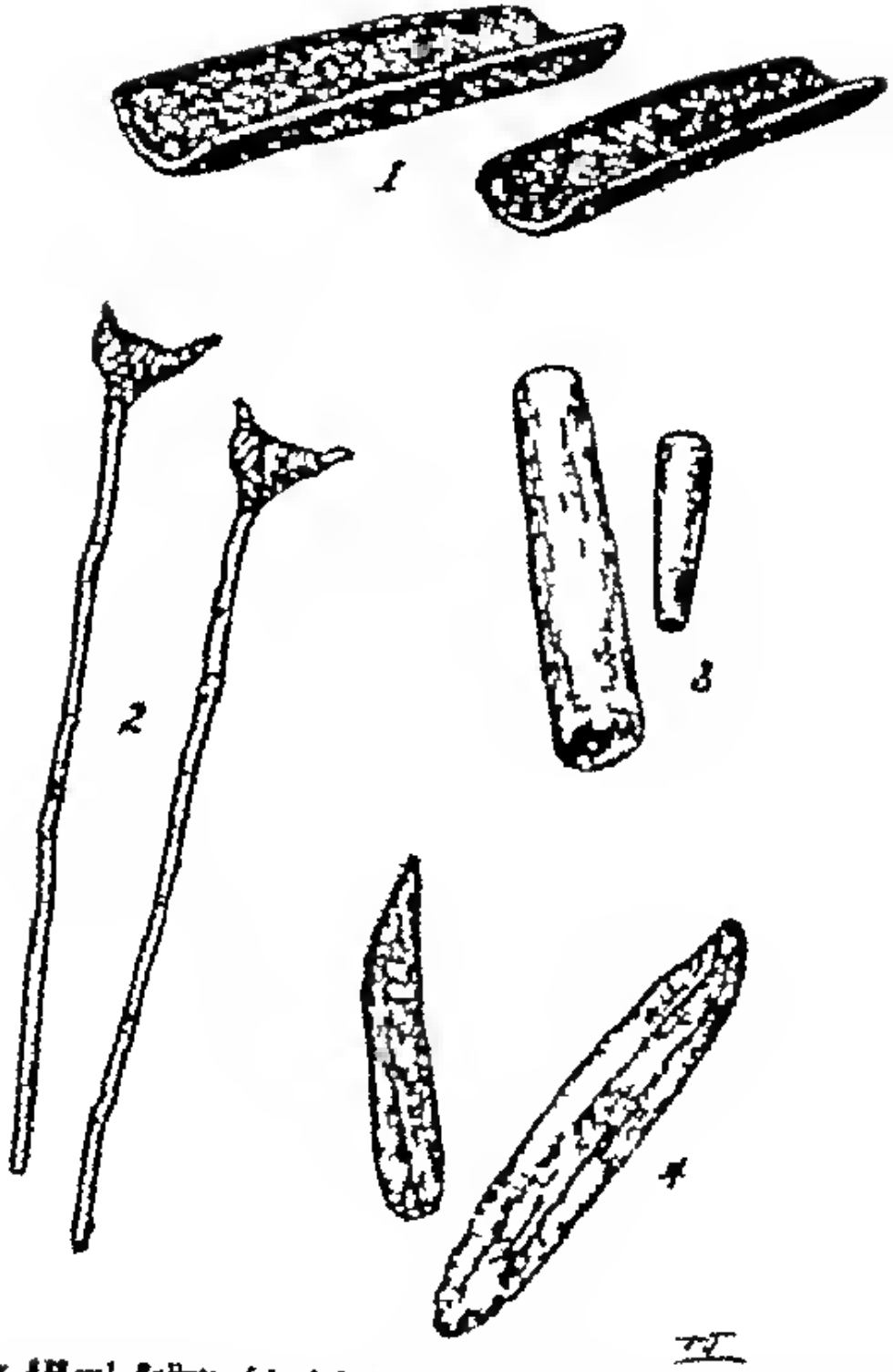


Fig. 488.—1 Splints of bark found in an ancient cliff dwelling of southwestern Colorado. These were padded with ...et clay and fitted to the bow-curved limb, then bound with rawhide (After Freeman.) 2, Crutches found in cliff dwelling of southern Utah. They may be due to the influence of the whites, though the primitive Indians were skilful in devising supports for the injured. Originals in Field Museum. (After Freeman.) 3, The burgar is peculiar wooden instrument with capped end, and hole on one side abutted

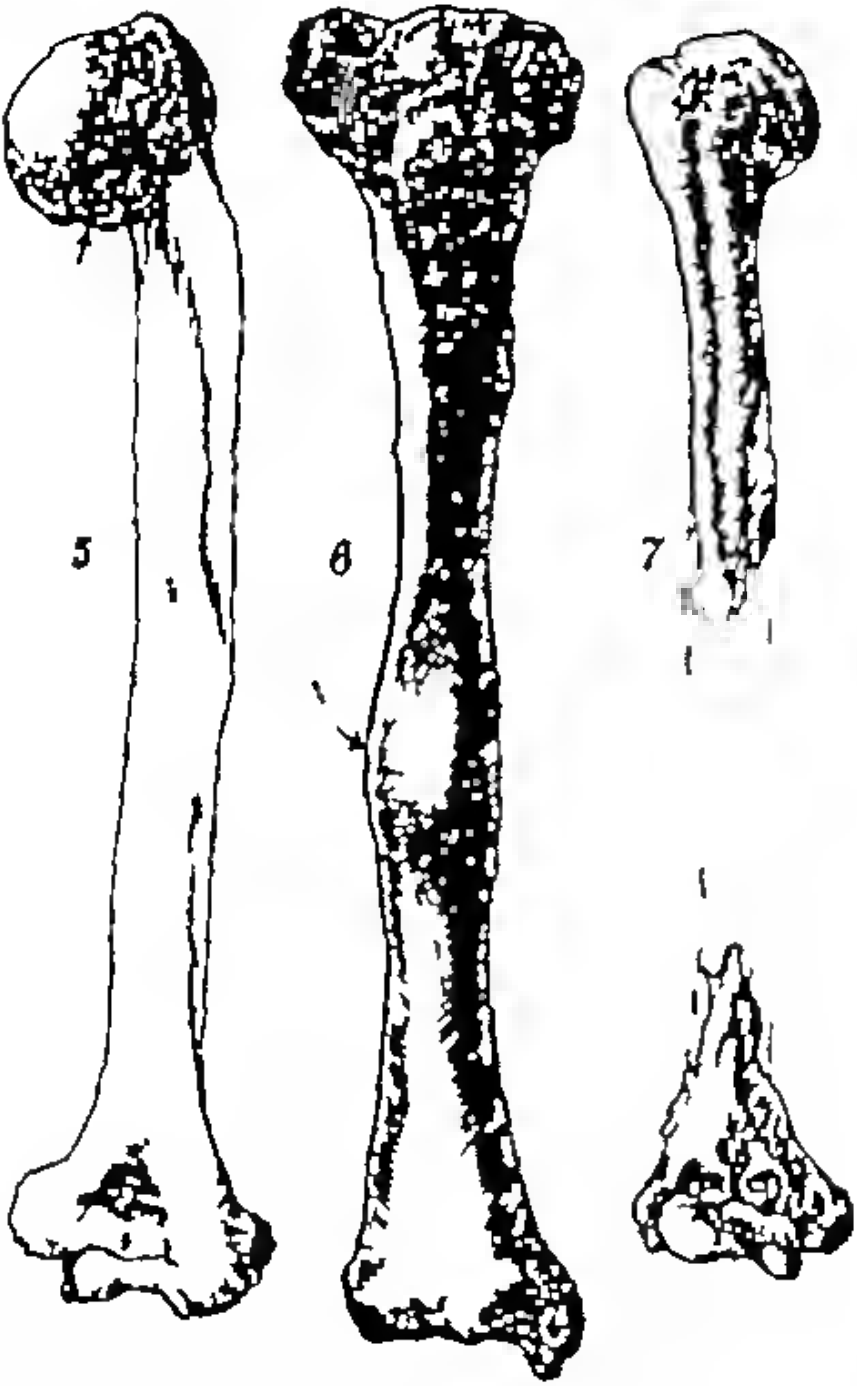


Fig 339.—5, Fractured humerus, well healed, of male pre-Columbian Indian from Huichol, Mexico. The lack of deformation may have been due to surgical interference, since it is well known that the Indians understood the use of bandages. Original in the American Museum of Natural History. 6, Well-healed fracture of right tibia of male pre-Columbian Indian, anterior view. May Lick, Kentucky. Original in American Museum of Natural History. 7, Right humerus of pre-Columbian female Indian, showing condition resembling sarcoma. The middle of the shaft has disappeared with the remaining ends tapering toward the lesion. Pueblo, San Cristobal, N. M. Original in American Museum of Natural History.

pathology A catalogue of this important collection has been prepared, but not yet printed. Dr Hrdlička's papers, in which there are references to early pathology will be later listed in a Bibliography Other writers on the Paleopathology of the early races of North America are Parker Orton, Langdon, and reviews by Fletcher Lamb, Hyde, Morgan, Bloch, Virchow and Buret.

KNOWLEDGE OF SURGERY

Surgery among the pre-Columbian Indians north of Mexico was in a comparatively rude state of advancement. They were still in the stone age of culture, and really knew less about surgical procedures than many other races of similar progress. A variety of minor surgical operations was known to them. Major surgery was an unknown field being indicated only by a few examples of trephined skulls found in northern Mexico. They removed small tumors, and appear to have been versed in the use of the ligature, using in late centuries horsehair for this purpose. Bloodletting, which they doubtless acquired from the whites, was extensively employed, irrespective of the disease. They used a sharp-pointed flake of flint for opening veins, like the one figured on the left in 4 Fig 338. This was often attached either by rawhide or later by an iron pin to a wooden handle. The blood was usually taken from the seat of disease. In severe cases of pains in the head they opened the temporal or posterior auricular vein or artery instead of trephining, as did many of the European peoples in Neolithic times.

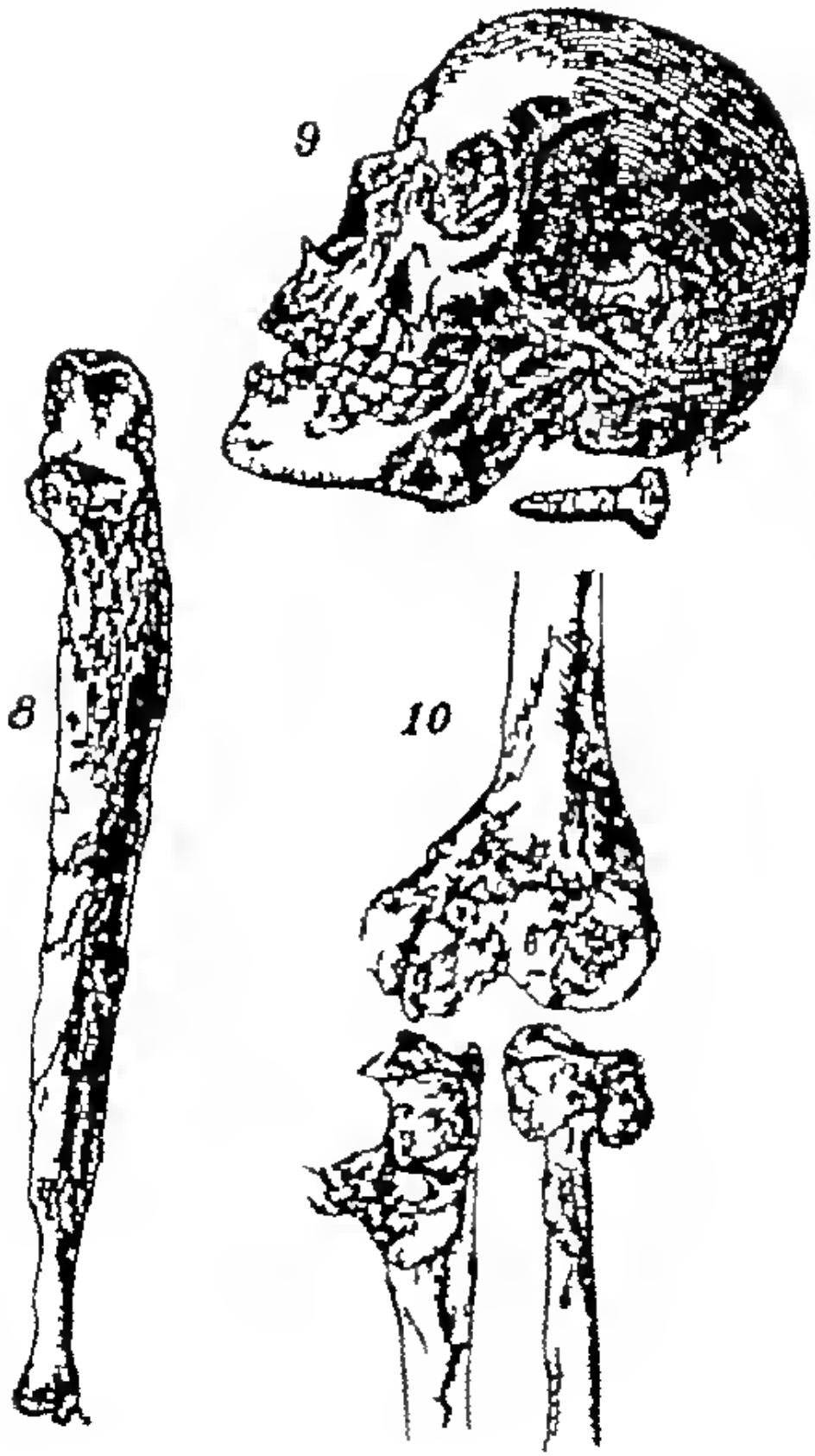
The Indians were really skilful in the use of splints for fractures, and they developed a variety of forms of protection for the injured member They were much further advanced in this regard than the ancient Egyptians How much the knowledge of treatment of fractures among the Indians was due to the influence of the whites is impossible to say The evidence points to some pre-Columbian knowledge of the subject. A particularly well healed tibia is shown in 6, Fig 339 A primitive form of splints is shown in Fig 338, 1 These were curved pieces of bark, either cut to fit the limb or else padded with wet clay which, on hardening, made a very good support. This parallels

and was almost as good a support as a plaster-of Paris cast. If nothing better offered strips of wet rawhide were bound tightly around the wounded member When dry this would make a firm support. Another favorite splint they frequently used was made of a number of thin, light slats fastened together with a buckskin thong so that the slats are all parallel, and about their own width apart. The flexible lattice work was properly padded and wrapped about the limb. The slats at either end of the splint were drawn together and tied, thus forming a light dressing for many types of injuries. This splint was often used for the prevention of movement of rheumatic limbs. The presence and virulence of arthritic infections are indicated by the lesions shown in 10 Fig 340

The North American Indians were also skilful in devising supports for injured members. A rude form of crutch is shown in 2 Fig. 338. They strapped the mammæ in case of abscesses and bandaged the thorax in all pulmonary inflammations. A flint knife, such as the one shown on the right in 4 Fig. 338 was used in opening abscesses and boils. The pus was generally removed by sucking either directly with the mouth or through a reed. The peculiar wooden instruments shown in 3 Fig 338 are said by Freeman to have been used in cupping The smaller instrument is a Cliffdweller's stone pipe used in the suction treatment of abscesses and suppurating wounds. Buffalo horn and other hollow objects were also used.

Amputation may have been occasionally employed, the bleeding being stopped by hot stones. The use of the tourniquet was undoubtedly slightly understood, and other coagulants,

Fig. 340.—8, Hypertrophied tibia of pre-Columbian Indian from Pueblo, San Cristobal, N M., showing congestive osteitis such recalls the results of syphilis. Such evidence is, however not sufficient to establish the presence of syphilis in pre-Columbian America. Original in the American Museum of Natural History 9 Ancient (pre-Columbian?) skull of an Indian found in Illinois, perforated in the temporal fossa by perforator arrow point, with the arrow withdrawn and sketched below An ancient war injury Original in National Museum at Washington. (After Wilson.) 10, Elbow-joint of pre-Columbian Indian from Pueblo Bonito, N M., showing the result of hypertrophic arthritis, th many burrowed surfaces. The exostoses are of highly cancellous bone. Original in American Museum of Natural History



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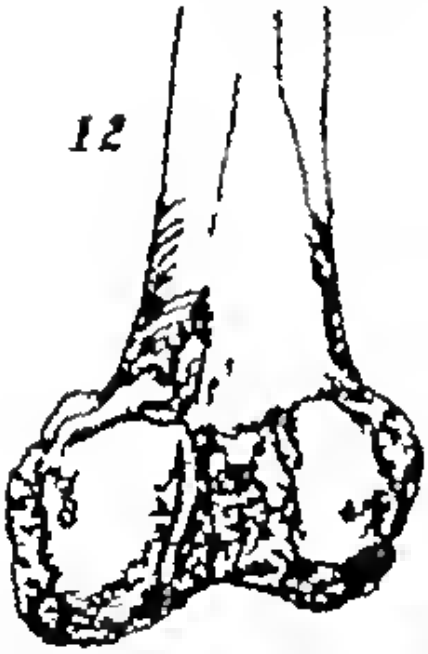

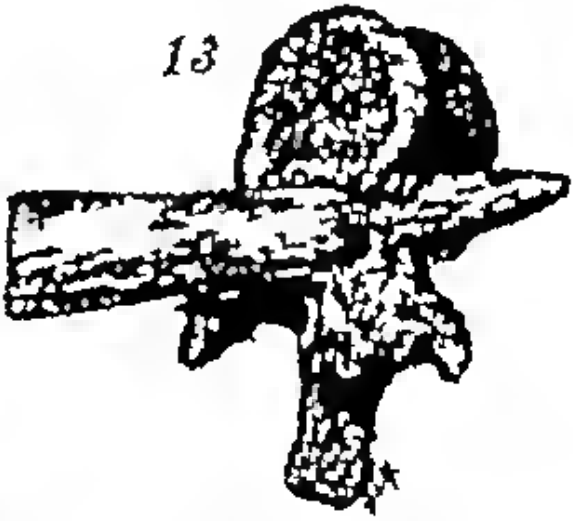

Fig. 141.—11 Exostoses of spondylitis deformans on sacrum, immediately below last lumbar of male pre-Columbian Indian from Grand Gulch, Utah. Original in American Museum of Natural History. 12, Lower posterior surface of the right femur of male pre-Columbian Indian from Cora, Mexico, showing lesions of osteo-arthritis. Original in American Museum of Natural History. 13, Lumbar vertebra of an Indian (pre-Columbian?) showing type of ancient injury. The spear-point of antler has penetrated the canal of the vertebra and has remained fixed after possibly hundreds of years since the injury was inflicted. Death doubtless ensued shortly after the injury for there is no indication of healing. (*After Hrdlicka.*)

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The knowledge of anesthetics among the pre-Columbian Indians was not extensive, though they knew the use of certain substances. The Zunis and other tribes employed a substance obtained from the jimson weed (*Datura meteloides*) containing stramonium. It was administered in sufficient quantities to produce indifference to pain or even complete unconsciousness, and in this condition abscesses were opened, fractures set, dislocations reduced, and other surgical procedures accomplished. This, according to Freeman, represents the knowledge of the Indians in modern times. It doubtless merely suggests the state of knowledge among the more ancient peoples who inhabited this continent. In this connection may be also mentioned the psychic states induced by the medicine men with their bizarre make-ups, wierd incantations, and fantastic antics, all of which were well calculated to make a profound impression on their credulous patients.

Trephining was practised among the Tarahumare Indians of Chihuahua in northern Mexico but this did not spread north of the Rio Grande. The few examples known are doubtless to be traced to influence emanating from Peru, where trepanning was extensively performed.

EVIDENCE OF PATHOLOGY AMONG AMERICAN ABORIGINES

The pre-Columbian Indians of North America suffered from a variety of injuries and disease, many of which resulted in surgical conditions. Whitney[1] has discussed these in his excellent contribution to paleopathology in which he describes a variety of traumatic conditions, such as skull fracture, arrow point wounds, fracture of the clavicle, arm femur as well as luxation of the hip congenital and otherwise. Among the constitutional affections he mentions a variety of exostoses, periostitis, arthritides caries, and doubtful evidences of syphilis.

It is curious to note that there are in the Peabody Museum Harvard University found in the stone graves of children in

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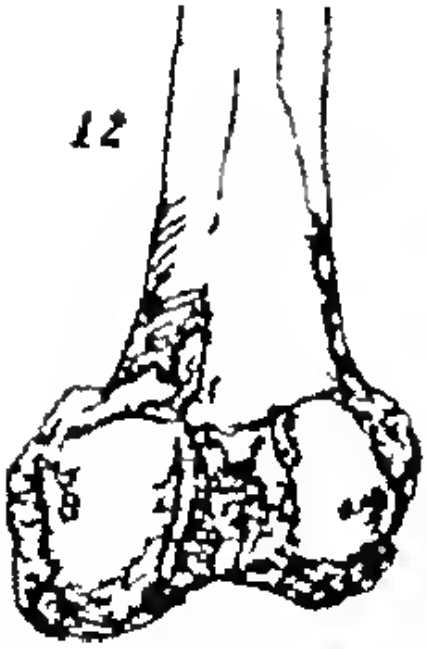

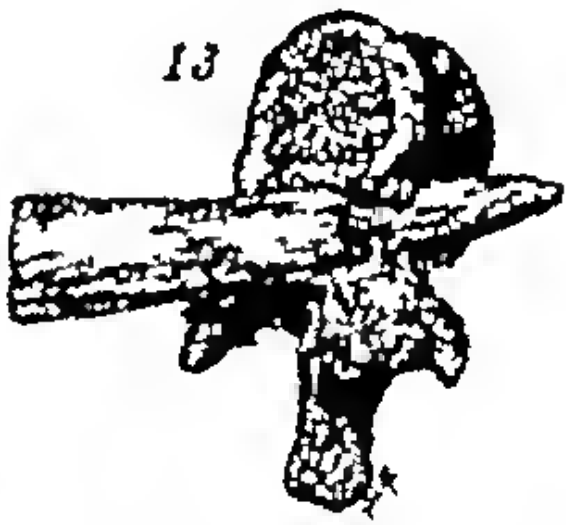

Fig. 341.—11, Exostoses of spondylitis deformans on sacrum, immediately below last lumbar of male pre-Columbian Indian from Grand Gulch, Utah. Original in American Museum of Natural History. 12, Lower posterior surface of the right femur of male pre-Columbian Indian from Cave, Mesita, showing lesions of osteo-arthritis. Original in American Museum of Natural History. 13, Lumbar vertebra of an Indian (pre-Columbian?) showing type of ancient injury. The spear-point of antler has penetrated the canal of the vertebra and has remained fixed after possibly hundreds of years since the injury was inflicted. Death doubtless ensued shortly after the injury for there is no indication of healing. (After Hrdlicka.)

such as spider webs and the fine fiber of plants, were employed. Operations for the removal of the pterygium was probably the only knowledge of ophthalmology among the Indians.

make a diagnosis of syphilis as their etiologic factor The changes he observed affected chiefly the diaphyses, consisting of large exostoses and osteophytic overgrowths, and characterized by the presence in the same specimen of both a rarefying and condensing osteitis, as demonstrated by gross and microscopic examination. Of 127 skeletons examined from one series of excavations, 21 showed traces of disease, 60 per cent. of the affected skeletons showed changes, most upon the tibia, with the ulna, cranium, and sternum following in order The exact age of these remains is uncertain.

The old Mound Builders of Missouri exhumed by Fowke show in the jaws and remnants of the alveolar processes an unusual prevalence about the roots of the teeth of pathologic conditions of an inflammatory and suppurative nature. A number of the femora and tibiæ present pathologic conditions of a protracted inflammatory nature, possibly to be regarded as syphilis.

The general nature of disease in relation to the early inhabitants of North America may be gathered from the conditions observed[1] in the skeletons of the Lenape Indians or Delawares, dating from the seventeenth century

> "The bones in the collection were exceptionally free from the effects of injury and disease. The skulls exhibit no scars or injuries, and no disease, with the exception of case of perforating mastoiditis in one of the children. There is, however considerable proportion of dental caries, with some indication of *pyorrhea alveolaris*

Evidences of injury with the formation of callus, complete ankylosis of humerus and ulna, periostitis, osteoperiostitis, osteitis deformans, slight arthritides, fractured ribs, and spondylitis deformans were observed on the 57 skeletons examined. Only four diseased conditions were observed, and there were no evidences of syphilis, rickets, tuberculosis, or tumors of the

[1] Ales Hrdlička Report on Skeletal Material from Missouri Mounds, Collected in 1906–07 by M Gerard Fowke, Bull. 37 Bur Amer Ethnol., Wash., 1910, 101.

Ales Hrdlička Physical Anthropology of the Lenape or Dela ares, and of the Eastern Indians in General, Bull. 62, Bur Amer Ethnol., Wash., 1916, 16.

Tennessee, Arkansas, and Missouri, little clay images which are faithful representations of persons affected with Pott's disease, and that many of the water-bottles from the stone graves of Tennessee and from the mounds of Missouri represent women with hunchbacks. Pott's disease is seldom indicated on skeletal remains, and it is possible that the clay images do not indicate any great prevalence of vertebral tuberculosis in these localities, but represent other spinal deformations.

The skeleton of an adult and a portion of the lower jaw of an infant were discovered near Lansing, Kansas, in February 1902. There has been considerable discussion of the antiquity of this skeleton, but there seems to be no proof that it is very ancient. Hrdlička is of the opinion "that the Lansing skeleton is practically identical with the typical male skeleton of a large majority of the present Indians of the Middle and Western states."

The skeleton, whatever its age, shows evidence of osteitis deformans, with interesting arthritides, which have been described by Dr Charles Parker

The lumbar vertebræ a metatarsal, the articular surfaces of the right femur and tibia show evidences of deforming arthritides. The lumbar vertebræ show the phalanging typical of spondylitis deformans, a disease which is common among various ancient as well as modern peoples. An exostosis occurs on the external condyle of the femur The articular surface of the bone at the place of bearing in semiflexion exhibits the typical eburnation of rheumatoid arthritis, with the characteristic striæ which average a millimeter part, and are reciprocal with similar ones on the tibia. The few slight changes seen in the skeleton probably offered no inconvenience to the original possessor other than an occasional 'rheumatic' pain in the knee-joint or an unpleasant twinge of the great toe.

The skeletal remains of the Mississippi and Ohio Valley mound builders not infrequently exhibit gross pathologic changes. The lesions of some of the bones examined by Orton led him to

Ales Hrdlička Skeletal Remains Suggesting or Attributed to Early Man in North America, Bull. 33 Bur Amer Ethnol Wash 1907 51.